



Social Capital Activation during Times of Organizational Change

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ABSTRACT

This dissertation contributes to our understanding of how people build and use social capital – resources embedded in social relations – in organizational settings. Whereas the extant literature has tended to focus on the *structure* of interpersonal networks within organizations and the link to various indicators of individual attainment, this dissertation instead uncovers the dynamics of network *action*. I tackle two central questions: (1) During times of organizational change, how do organizational actors use the social resources accessible to them by virtue of their position in the structure? and (2) What organizational interventions can help people forge valuable new connections in the workplace? Core to this investigation is the concept of social capital activation – that is, the conversion of latent social ties into active relationships.

Three empirical studies illuminate different facets of social capital activation during commonly experienced forms of organizational change: (1) an organizational restructuring; (2) large-scale transformations that create individual-level threat or opportunity; and (3) the introduction of a novel employee cross-training program. Because organizational change is often accompanied by significant shifts in resources and power, network activation choices in these periods can have significant consequences for individual attainment and organizational performance.

I draw on unique data from three disparate settings – a global information services firm; a large health care organization; and a software development lab based in Beijing, China. Multiple research methods, including a large panel data set of archived electronic communications, qualitative interviews, experimental studies conducted with samples of working professionals, and a longitudinal field experiment, are used to identify how organizational actors marshal social resources through individual-level network activation choices.

Findings from these studies contribute to research on: (1) organizational social capital; (2) the structural dynamics of organizational change; (3) ascriptive inequality in organizations; (4) cognition and social networks; and (5) workplace practices and network change.

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and a paper we have co-authored), he has not only lived up to but even exceeded this billing. From Toby I have gained an appreciation for what it takes to compete among the best in the field. For example, early on in the program, Toby encouraged me to push myself by taking the most challenging quantitative methods sequence available. He also saved me from pursuing research projects that sounded appealing on the surface but were likely to fail. I still remember his comments on my initial dissertation prospectus: “The ideas are interesting, but the causal effects will not be well identified. You might even get this published in a top journal, but you are not going to convince the people you should care about convincing.” I was disappointed and frustrated at the time. After reflecting on Toby’s feedback, however, I came to the conclusion that he was right. I decided to scrap that research project in favor of this dissertation. I have come to appreciate Toby’s willingness to provide tough and honest feedback. He also generously shared his inside knowledge about the publication process and staunchly advocated for me on countless occasions.

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CHAPTER 1: INTRODUCTION

This dissertation contributes to our understanding of how social capital is built and used in organizational settings. I follow Lin (2001: 29) in conceiving of social capital as “resources embedded in a social structure that are accessed and/or mobilized in purposive actions.”

Examples of these resources include novel information, political influence, social support, and identity confirmation. The extant literature has tended to focus on the link between the *structure* of interpersonal networks within organizations and various indicators of individual attainment – for example, performance evaluations and rewards (Burt 1992), career mobility (Podolny and Baron 1997; Seibert, Kramer, and Liden 2001), the ability to close customer deals (Mizruchi and Stearns 2001), and relative power and influence (Brass 1984). Yet, despite the importance of networks for individual success, remarkably little is known about network *action* – that is, how valuable social resources are created and mobilized by organizational actors.

In this dissertation, I address two central questions about network action: (1) How do people use the social resources accessible to them by virtue of their position in the structure? and (2) What organizational interventions can help people forge valuable new connections in the workplace? Central to this investigation is the concept of social capital activation. At any given time, many network ties that are potential sources of valuable resources are latent – that is, people have pre-existing relationships but no current interaction with a set of individuals. During times of organizational change, individuals convert some latent ties into active relationships – that is, they initiate contact with individuals with whom they have a pre-existing relationship (Pescosolido 1992). Following Hurlbert, Haines, and Beggs (2000: 599), I define social capital activation as the choice to initiate contact with certain individuals among the set of actors in one’s pre-existing network. Because organizational change is often accompanied by significant

shifts in resources and power, network activation choices in these periods can have significant consequences for individual attainment. To the extent that these individual-level choices cumulate to shift aggregate network structure, they can also have implications for organizational performance (Gulati and Puranam 2009).

The three empirical studies in this dissertation illuminate different facets of network activation during commonly experienced forms of organizational change: (1) an organizational restructuring; (2) large-scale transformations that create individual-level threat or opportunity; and (3) the introduction of a novel employee cross-training program. I draw on unique data from disparate settings – an information services firm; a non-profit health care organization; and a software development lab based in Beijing, China. Multiple research methods, including a large panel data set of archived electronic communications, qualitative interviews, experimental studies conducted with samples of working professionals, and a longitudinal field experiment, are used to identify how organizational actors marshal social resources through individual-level network activation choices.

Outline of the Dissertation

The dissertation comprises five chapters, including this introductory one. Chapter 2 examines network activation during the uncertainty of organizational restructuring. It clarifies the role of organizational structure in influencing network activation choices under conditions of uncertainty. I derive propositions about the kinds of social resources that actors are likely to seek from contacts defined by different facets of organizational structure: the formal structure of organizational subunits, the quasi-structure of work groups that span the formal structure, and the emergent network. These propositions are tested using a unique data set: 40 weeks of archived electronic communications among 114 employees in an information services firm that underwent

a major restructuring. Analyses reveal that the heightened uncertainty of restructuring led to: (1) an increase in network range across the formal structure of organizational subunits; (2) a decrease in range across the quasi-formal structure of work groups that span formal subunits; and (3) a decrease in range across sex lines, which was fueled by an increase in communication between both-female dyads. These findings contribute to research on social capital, the structural dynamics of organizational change, and restructuring and ascriptive inequality.

Chapter 3 helps to clarify how organizational actors interpret and respond to different kinds of uncertain situations through the activation of social capital. Three social theories – threat-rigidity, reactance, and loss aversion – inform expectations about the size and shape of networks that organizational actors will activate when facing uncertain situations of threat or opportunity. Two experimental studies, which involve 158 executives in a large health care organization and 129 employees in smaller establishments, help assess these propositions. Neither study supports the predictions of threat-rigidity theory. Both studies suggest conditional support for reactance theory: the tendency to activate more ties under constraint (rather than agency) was moderated by an individual’s internal locus of control. Loss aversion’s predictions are mostly supported: uncertainty associated with loss (rather than gain) led people in both studies to activate more ties and, in Study 1, to activate a greater proportion of organizationally distant ties. Together, the two studies advance our understanding of the cognitive underpinnings of social capital activation.

Chapter 4 assesses the causal effects of cross-training, a core element of the “high performance work” practices that have diffused broadly across firms, on workplace social networks. I derive theoretical propositions about the effects of cross-training on the size and composition of workplace networks, the moderating role of individual differences in cognition

about the self as a collaborative actor, and sex differences in the treatment effect of such programs. Semi-structured interviews with 40 past program participants and a longitudinal field experiment involving 91 participants in a cross-training program at a software development laboratory in China and 85 matched non-participants reveal that: (1) relative to non-participants, participants in cross-training reported an expansion in workplace networks; (2) the tendency to form bridging ties was amplified for participants with a more collaborative implicit self-concept; and (3) relative to males, female participants reported a greater expansion in workplace networks. These findings contribute to research on workplace practices and network change, cognition and social networks, and sex-based inequality in organizations.

Chapter 5 summarizes the dissertation's core contributions. It also identifies promising avenues for future research on social capital activation.

CHAPTER 2: SOCIAL CAPITAL ACTIVATION DURING THE UNCERTAINTY OF ORGANIZATIONAL RESTRUCTURING

INTRODUCTION

Social networks are often conduits to valuable resources – such as information, influence, social support, and identity confirmation – that can promote individual attainment (Burt 1992; Lin 2001; Podolny and Baron 1997). Yet just because valuable resources are available through social relations does not always mean they will be tapped. For example, trust-based barriers (Smith 2005), cognitive recall of relationships (Smith, Menon, and Thompson 2012), and interpersonal affect (Casciaro and Lobo 2008) all can constrain the set of contacts people turn to and the nature of resources they obtain. That is, in many situations, people *activate* only a subset of the relations to which they have *access*.

Because the distinction between activation and access can have consequences for the actual, rather than just potential, resources that accrue to individuals, a burgeoning literature has begun to examine the dynamics of tie activation (Hurlbert, Haines, and Beggs 2000; Renzulli and Aldrich 2005; Smith 2005). Whereas the extant literature has focused on job searches through which people enter organizations, this article brings the study of social capital activation to the intraorganizational context. It addresses the question: How does social structure – in particular, pre-existing organizational structure – influence how people activate social networks to obtain resources during times of change, such as a major restructuring?

A distinguishing feature of many restructuring events is that they breed high levels of uncertainty for organizational actors – for example, about whether they will remain employed or what job they will hold. This uncertainty can, in turn, prompt actors to reach out to known social contacts for information, political influence, and social support (Mizruchi and Stearns 2001; Pescosolido 1992). Uncertainty exerts two divergent forces on the range of activated networks –

i.e., the diversity of individuals to whom a person initiates contact (Burt 1983; Reagans and McEvily 2003). On one hand, uncertainty can lead people to increase network range – that is, activate ties to distant or dissimilar colleagues who hold resources, such as non-redundant information (Friedkin 1982) or political influence (Pfeffer 1989; Pfeffer 1992), that become more valuable in uncertain times (Burt 2000). On the other hand, uncertainty can lead people to decrease network range – that is, activate ties to trusted colleagues who are proximate or socially similar (McDonald and Westphal 2003; Mizuchi and Stearns 2001). The net effect of these forces is important to understand because intraorganizational network activation can have consequences for individual attainment (Burt 1992; Podolny and Baron 1997; Seibert, Kramer, and Liden 2001) – especially when, as in a restructuring event, power and resources are in flux (Pfeffer 1989). It can also influence the level and quality of social support that people obtain to withstand the stresses of uncertain times (Cohen and Wills 1985; House, Umberson, and Landis 1988; Swanson and Power 2001).

In the remainder of this article, I derive propositions about how the search for social resources in response to uncertainty affects network range across different facets of organizational structure – the formal structure of organizational subunits, the quasi-structure of work groups that span the formal structure, and the emergent network (Ibarra 1992b). Next I report on a study that takes advantage of the quasi-exogenous shock of restructuring to identify the effects of uncertainty on network activation. The analysis draws on a longitudinal data set, which spans 40 weeks and includes the electronic communication logs of 114 employees, company-wide email distribution lists, employee communications memos, and human resource records. These data provide a rare look into an organization before, during, and after a spell of uncertainty. To address the limitations of archival data, I also report on semi-structured

interviews with a subset of these employees. Findings from this investigation contribute to research on social capital activation, the structural dynamics of organizational change, and restructuring and inequality.

THEORY

Organizational Restructuring and Uncertainty

I follow prior research in defining organizational restructuring as “any major reconfiguration of internal administrative structure that is associated with an intentional management change program” (McKinley and Scherer 2000). These changes are often accompanied by downsizing and changes in reporting relationships. Even when organizational restructuring is well anticipated, it can produce uncertainty for organizational actors because one set of changes can trigger a cascade of other realignments that are difficult to predict (Hannan, Polos, and Carroll 2003a; Hannan, Polos, and Carroll 2003b). Different forms of organizational restructuring can produce distinct flavors of uncertainty for organizational actors. I draw a conceptual distinction between restructuring that produces uncertainty at the level of collective entities and restructuring that creates uncertainty at the level of individual actors. Restructuring of the former variety might, for example, entail the potential elimination of a particular organizational subunit. The resulting uncertainty would likely trigger feelings of solidarity among members of the affected unit and potentially lead to collective network action (e.g., banding together to defend the unit). Restructuring of the latter variety might target the elimination or merger of many subunits or involve substantial movement of people across subunits. In this case, uncertainty is more likely experienced at the level of individual actors, who will seek to mobilize the resources available to them through their own networks. The conceptual arguments developed below

pertain to the latter: situations of organizational change in which individual actors face generalized uncertainty about their standing in the organization – for example, whether they will remain employed, to whom they will report, and how their job roles will change.

Social Capital Activation

I follow Lin (2001: 29) in conceiving of social capital as “resources embedded in a social structure that are accessed and/or mobilized in purposive actions.” At any given time, many network ties that are potential sources of valuable resources are latent – that is, people have pre-existing relationships but no current interaction with a set of individuals. In the wake of events, such as restructuring, individuals convert some latent ties into active ones – that is, they initiate contact with individuals with whom they have a prior relationship (Pescosolido 1992). Following Hurlbert, Haines, and Beggs (2000: 599), I define social capital activation as the choice to initiate contact with certain individuals among the set of actors in one’s pre-existing network.¹

Social Capital Activation under Uncertainty

The uncertainty of restructuring can be expected to exert two divergent forces on network range.² On one hand, under conditions of uncertainty, the resources held by socially distant or dissimilar colleagues can become more valuable (Burt 2000; Pfeffer 1989; Pfeffer 1992). For example, colleagues in other parts of the organization may possess crucial non-redundant information (Friedkin 1982). Similarly, past supervisors, potential future supervisors, and mentors in other parts of the organization may wield political influence over career decisions. Thus, people are motivated to strengthen political coalitions with contacts in other parts of the organization

¹Smith (2005) defines social capital activation to include both an individual’s choice to seek resources from a contact and the contact’s choice to provide aid to the help seeker. Because my arguments pertain only to the choices of the focal actor, I focus on the former choice.

²Note that an increase in range can occur in two ways: (1) the increase in contact with colleagues who are different in some respect (e.g., departmental affiliation) is greater than the increase in contact with colleagues who are the similar in that respect; or (2) the decrease in contact with colleagues who are similar in some respect is greater than the decrease in contact with colleagues who are different in that respect.

(Pfeffer 1989; Pfeffer 1992). On the other hand, uncertainty tends to decrease network range, as people seek contact with longstanding, trustworthy exchange partners (Cook and Emerson 1978). Such partners tend to be socially proximate or similar (Buchan, Croson, and Dawes 2002; Macy and Skvoretz 1998). For example, uncertainty can prompt CEOs to seek advice from contacts with the same functional background and in the same industry rather than contacts with different functional backgrounds or in different industries (McDonald and Westphal 2003). Similarly, bankers operating in uncertain settings seek information from close contacts when seeking advice on and support for deals (Mizruchi and Stearns 2001). How do these different forces influence the activation of ties within the organization?

Social Resources and Dimensions of Intraorganizational Network Range

I argue that network activation choices during the uncertainty of restructuring are importantly influenced by the nature of social resources that actors seek to obtain and different aspects of organizational structure. Drawing on Lin's (2001) framework of social resources, I consider organizational actors' search for non-redundant information, political influence, and identity confirmation. Consistent with prior research suggesting that network range is a multidimensional construct (Campbell, Marsden, and Hurlbert 1986), I consider uncertainty's effects on network range across three facets of organizational structure: (1) formal subunits, (2) the quasi-formal structure of work groups, and (3) the emergent network. Ibarra (1992b: 166) defines formal subunits by the "specified relationships between superiors and subordinates and among functionally differentiated groups that must interact to accomplish an organizationally defined task." The quasi-formal structure encompasses the myriad work groups, such as "committees, task forces, teams, and dotted-line relationships that are formally sanctioned by the firm" but do

not correspond to the organizational chart.³ In many organizations, people belong to a handful of formal subunits, based on their hierarchical reporting relationships, and to many different work groups, based on the workflows and decision processes in which they participate. Finally, the emergent network “involves informal, discretionary patterns of interaction where the content of the relationship may be work related, social, or a combination of both.”

Network Activation across Formal Subunits

For three reasons, I expect that the uncertainty of restructuring will lead people to increase network range across formal subunits. First, colleagues in other departments are more likely to possess non-redundant information about the restructuring (Friedkin 1982), such as which individuals and groups are likely to be affected by the organizational change and what job vacancies are likely to be created. The search for this non-redundant information will tend to increase cross-department contact. Second, uncertainty can trigger the exercise of power and influence tactics. Organizational actors are apt to use these tactics during situations “like reorganizations and budget allocations...and in instances where there is likely to be uncertainty and disagreement” (Pfeffer 1992: 37). If the uncertainty of restructuring means that current reporting relationships and departmental affiliations may not persist, people will instead direct attention toward colleagues in other organizational subunits who can advocate on their behalf – for example, keep their names off employee layoff lists and lobby decision makers to help them secure coveted positions. Finally, in many organizations, periods of restructuring are governed by strong communication norms. For example, managers are instructed to communicate only officially sanctioned messages, hew to pre-specified communication timetables, and refrain from ‘leaking’ information to subordinates (for an illustration of prescribed communication protocols

³Soda and Zaheer (forthcoming) follow a similar approach, distinguishing between “authority relationships” and “workflow relationships.”

for managers leading organizational change, see Klein [1996]). As a result, the opportunity structure for exchange within formal subunits can become constrained (Marsden 1983), resulting in the constriction of intra-subunit communication. These arguments suggest that, although people are still likely to remain in contact with close colleagues in the same subunit during a restructuring, they will tend to shift the focus of network activation toward contacts in other departments who can provide better information and different forms of influence and who have fewer constraints on their ability to share these resources. Thus, I hypothesize:

Hypothesis 1a: An increase in uncertainty will lead to an increase (decrease) in contact among colleagues in different (the same) formal subunits. That is, an increase in uncertainty will lead to an *increase* in range across formal subunits.

Network Activation across Work Groups that Span the Formal Structure

Next I consider the interplay of the formal and quasi-formal structure. I start by noting that the forces pushing toward an increase in range across formal subunits will instead be muted in the case of work groups that span the formal structure. Whereas the search for non-redundant information will lead people to activate ties to colleagues in different formal subunits, there will be no corresponding preference for interaction with colleagues in different cross-cutting work groups. In work groups that span the formal structure, members are drawn from different formal subunits. Thus, colleagues in the same work group are still likely to possess non-redundant information. Similarly, because they are outside the formal subunit structure, they are likely to wield different sources of power and influence than colleagues in the same subunit. Finally, whereas normative constraints can limit communication within formal subunits, there are few

such limitations to the exchange of information and gossip within work groups (Balogun and Johnson 2004; Isabella 1990). Thus, to fill the information void within formal subunits, people are apt to seek information from trusted colleagues in work groups that span the formal structure. An increase in uncertainty will therefore not produce a comparable expansion in network range across work groups as expected in the case of formal subunits. At the same time, the countervailing force – the tendency of people to seek contact with longstanding, trustworthy exchange partners under conditions of uncertainty (Cook and Emerson 1978; Kollock 1994; Molm, Peterson, and Takahashi 2000; Podolny 1994) – will tend to draw people toward proximate colleagues in the work group structure. To put it differently, as people search outside of the formal structure for non-redundant information and political influence, they will tend to turn to colleagues who are outside of their subunits but still proximate in the quasi-structure of work groups that span formal subunits. Thus, I expect:

Hypothesis 1b: An increase in uncertainty will lead to a decrease (increase) in contact among colleagues who are distant (proximate) in the quasi-structure of work groups that span formal subunits. That is, an increase in uncertainty will lead to a *decrease* in range across work groups that span formal subunits.

Network Activation across the Emergent Network

As Kanter (1977: 49) observed in her study of social dynamics in the workplace, “[A] higher degree of uncertainty brings with it a drive for social similarity.” Consistent with this observation, I argue that the uncertainty of restructuring will lead people to decrease network range across social groups in the emergent network. Although organizations contain myriad

social groups, I focus on those defined by ascriptive traits – in particular, sex and ethnicity – because these attributes have been linked to intraorganizational network patterns (Ibarra 1992a; Lincoln and Miller 1979).

Restructuring-induced uncertainty – for example, whether one will remain employed by the organization and to which organizational subunit one will belong – will force organizational actors to reconsider their self-concept and their place in a changing social world. According to self-categorization theory, under such conditions people are motivated to reduce doubts about their identity (Hogg 2000; Hogg and Mullin 1999; Hogg and Terry 2000). In particular, they engage in the process of self-categorization – linking the self to a prototype (i.e., a cognitive representation of the attributes and stereotypes of a group) that both describes and prescribes perceptions, attitudes, feelings, and behavior. Because the most effective prototypes are “simple, clear, highly focused, and consensual” (Hogg and Terry 2000: 124), those based on ascriptive traits tend to be especially powerful. As they assimilate their self-concepts with the most effective available prototypes, people will therefore tend to identify and seek to affiliate with others of the same sex and ethnicity. I therefore expect:

Hypothesis 2a: An increase in uncertainty will lead to a decrease (increase) in contact among colleagues of the opposite (same) sex. That is, an increase in uncertainty will lead to a *decrease* in range across males and females.

Hypothesis 2b: An increase in uncertainty will lead to a decrease (increase) in contact among colleagues of different ethnicities (the same ethnicity). That is, an increase in uncertainty will lead to a *decrease* in range across ethnic groups.

METHODS

Research Setting

A major information services company, hereafter referred to as InfoCo, served as the research site for the study. It employed over 8,000 employees and generated over \$3 billion in revenue. The company's formal structure consisted of global business divisions, regional marketing and sales units, a global product development unit, and shared support functions (e.g., Finance).

Declining financial performance led InfoCo's management team to undertake a major restructuring. There were three major organizational changes. First, InfoCo created global "solution lines," which combined product development and marketing resources from different regions into newly formed formal subunits that had global responsibility for the profitability of a set of related products and services. Next, InfoCo consolidated the sales and marketing subunits and downsized redundant personnel in these two functions. Finally, a new global marketing subunit was established to set standards and ensure consistent implementation across regions. Many people lost their jobs, moved departments, or changed supervisors during this period.

Study Participants

The study included all 114 US-based members of the InfoCo's senior leadership group.⁴ They were mostly male (67.5%), white (84.2%), and geographically concentrated: 38.6% in a Midwestern city, 19.3% in New York City, and the rest were distributed among smaller sites. They spanned three salary bands (in ascending rank): 7.5% operational leaders, 80.3% tactical leaders, and 12.2% executive leaders. I collected archived electronic communications and human resource data on all of these individuals and conducted semi-structured interviews with a subset (see Appendix 2.A; further details below). Because of concerns about how rank-and-file

⁴Approximately thirty individuals outside the US were also members of the senior leadership team. Privacy laws and company policies regarding the use of employee emails in certain countries prevented me from including them in the study.

employees might react if they somehow became aware of the study (e.g., distraction, distrust of senior management), it was not possible to include a broader cross-section of employees.

The choice to focus on a relatively senior employee population involves clear tradeoffs. On the one hand, they all had pre-existing ties to one another through their involvement in the senior leadership group. Thus, they were an appropriate sample for the study of network activation (rather than new tie formation). In addition, although they were fairly senior, they had little *ex ante* knowledge of the restructuring, which the CEO implemented with limited input from this group. That is, they experienced uncertainty during restructuring. During the time that archival data were being collected, they were also unaware of this study.⁵ Moreover, the qualitative evidence (see Appendix 2.B) suggests that lower level employees experienced greater levels of uncertainty than the people included in the study. Thus, the focus on senior employees probably provides a conservative test of the proposed hypotheses; however, it also raises questions about the extent to which the findings can be generalized to other employee groups. Further implications of this choice are explored in the Discussion and Conclusion section below.

Before describing the data collected, I present evidence that the people included in the study did, in fact, experience a high level of uncertainty during restructuring. First, these individuals were significantly affected by the restructuring: 43 (37.7%) had a change in supervisor, 15 (13.6%) moved to a different InfoCo division, and 13 (11.4%) exited the company.⁶ Some experienced multiple such changes. Second, the qualitative evidence suggests that they felt uncertain and that the restructuring represented a quasi-exogenous shock. As one

⁵Knowledge of the study was kept to a small group (i.e., CEO, head of HR, handful of others) to minimize organizational distraction.

⁶I included the thirteen who exited in the analyses because, during the periods that they were employed by InfoCo, they were at equal risk of exchanging messages as their colleagues who did not exit. There were no significant differences between those who stayed and those who exited on observable characteristics such as tenure, rank, gender, or ethnicity.

marketing director reported, “The announcement happens, and then I get a call from HR and the guy who was my boss at the time. They say, ‘We’re eliminating your role, and you’re not going to get job you thought you were going to get.’ Then they offered me another job that I really didn’t want. I was stunned.” Similarly, a director in charge of a marketing support unit recalled:

I literally landed at [City] Airport, checked my messages, and saw that I was invited that afternoon to a call with the CEO and a strange list of other people. I sent a note to my boss to find out what this was all about. He called me to say, “Find a place to sit down.” He then told me that they had eliminated [my peer’s] position, and I was assuming responsibility for his group.... I had a ton of questions about this. Was this part of a broader set of changes that would affect me, or was this the only shoe to drop?

A product development manager reported: “[L]eaders were given a certain number of slots to fill. We had to go through a process of assessing and ranking people – for example, eleven people might be ranked for a job role with ten open slots. The eleventh person was laid off. If the job role was redefined, we had to tell all incumbents that they were laid off and had to interview to get their job back. Everyone was feeling insecure.” Similarly, a division general manager stated, “Our reorganizations tend to be big surprise events when they are unveiled.”

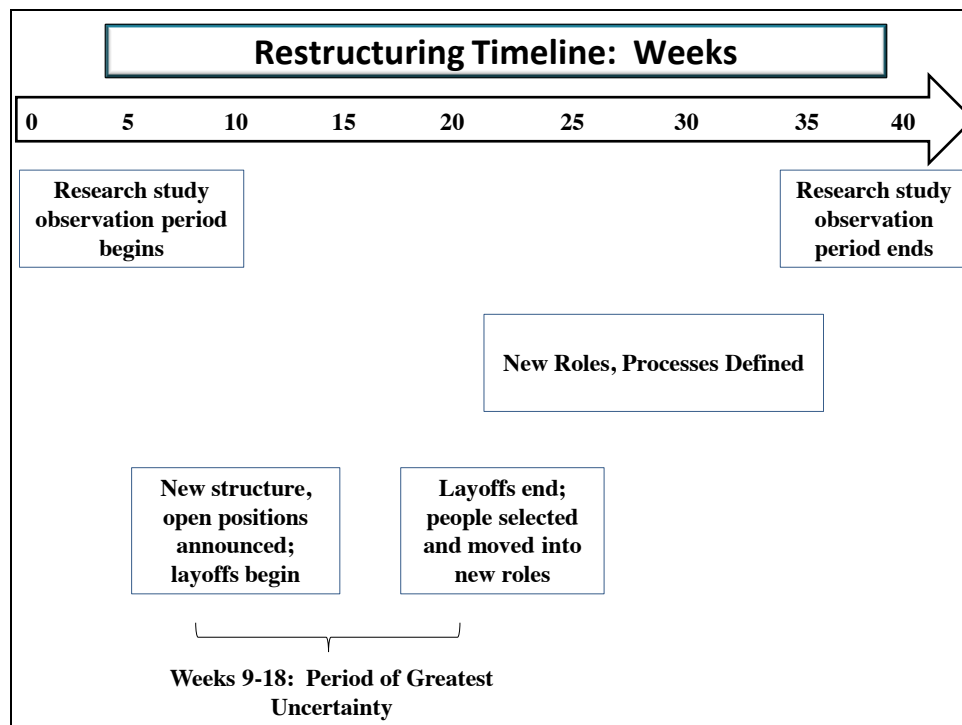
Data Collection

I compiled four kinds of archival data: (1) internal communication memos, which I used to establish the period of greatest uncertainty stemming from the restructuring; (2) email logs (spanning a period of 40 weeks) of 114 InfoCo employees⁷; (3) extracts from InfoCo’s Human Resource (HR) system – including time-invariant measures (e.g., sex, ethnicity, date of hire) and time-varying measures (e.g., departmental affiliation, office location); and (4) extracts of InfoCo’s email distribution lists to identify shared work groups among employees (i.e., based on list co-membership in a given week). Based on these communications and the interviews, I

⁷Prior research indicates that this time period is appropriate for the study of employee reactions to restructuring (Brockner, Tyler, and Cooper-Schneider 1992; Shah 2000).

established that the period of greatest uncertainty commenced in Week 9, when the first of several communications providing details of the new organizational structure was released. Additional memos – announcing the formation of global solution line units, the consolidation of other organizational units, and the appointment and departure of key personnel – were sent every couple of weeks until Week 18. By Week 18, all of the changes to the organizational structure had been made, all key positions had been filled, and all departing employees had exited. Thus, although there was uncertainty throughout the observation period, Weeks 9 through 18 represented the period of peak uncertainty (see Figure 2.1). Given some subjectivity in the choice of the uncertainty period, I report in the Robustness Checks section below the results of an alternative analysis based on a continuous measure of uncertainty in each time period.

Figure 2.1: Timeline of Key Events



Data – Email Logs

Analyses of email communication are becoming increasingly common in organizational research (Allatta and Singh 2011; Hinds and Kiesler 1995; Kossinets and Watts 2006; Menchik and Tian 2008). Consistent with the ethical standards used in prior studies, I took three steps to protect the privacy and confidentiality of InfoCo employees (for a discussion of ethical issues in organizational network analysis, see Borgatti and Molina [2005] and Kadushin [2005] Borgatti and Molina 2005). First, all identifying information was encrypted using an irreversible algorithm. Second, email logs did not contain message content – just the trace of who sent a message to whom, at what date and time, and with what subject line. Third, I only collected data on messages exchanged among InfoCo employees – that is, external messages were excluded.

Electronic communications data of this kind have several advantages over traditional network surveys. First, they can be collected unobtrusively, which can be useful in observing network dynamics during a politically sensitive time such as an organizational restructuring. Next, they provide a window into peripheral ties, which network surveys typically do not seek to measure. Moreover, they can also yield more reliable indicators of interaction than surveys, which can suffer from various forms of recall and self-report bias (Marsden 2011). For longitudinal network analysis, they have the added benefit of allowing for consistent data collection over time (e.g., by eliminating measurement error created by variation in interviewer techniques or the context in which surveys are filled out) and limiting the risk that people drop out of the study due to survey fatigue. At InfoCo, interviewees reported that they routinely used company email even for personal communication. At the time of the restructuring (early 2008), it was uncommon for InfoCo employees to use instant messaging or personal email services at

work. In addition, emails sent from personal digital assistants also went through the company servers.

These benefits are counterbalanced by certain limitations. First, the trace of email communication between two colleagues does not always signify purposive interaction between them. For example, email messages can sometimes be automatically generated – e.g., “Out of Office” message sent when a recipient is on holiday. In addition, emails are sometimes sent to pre-determined distribution lists or routinely copied to colleagues who have little interest in or need to know the information. I addressed these shortcomings by eliminating all emails that included the phrase “Out of Office” in the subject line and by restricting the analysis to emails sent only to a single recipient.

Next, email exchanges reflect only a subset of the interactions among people. Face-to-face meetings, phone calls, and informal gatherings at the water cooler are not captured in email logs – though prior research suggests the email communication is highly correlated with face-to-face and telephone interaction (Kleinbaum, Stuart, and Tushman 2008). In this setting, the email system was also linked to the electronic calendars that virtually all employees used to maintain their daily schedules. Email logs therefore included a record of all electronically scheduled meetings. One interviewee explained:

Of course you wouldn’t talk about very sensitive topics over email. You will generally want to have the sensitive discussions in a face-to-face meeting. But you might see this kind of interaction reflected in email scheduling traffic. If I were feeling anxious about my own situation, I would schedule a one-on-one meeting with my mentor or some other trusted colleague.

In the end, taking into account the strengths and limitations of email as a data source, I submit that measures of network activation based on email data likely yield conservative estimates of shifts in network range across all communication media.

Data – Email Distribution Lists

Just as the choice to use email data involves tradeoffs, so too does the decision to use email distribution lists to locate individuals in the work group structure. Widely used across organizations and readily accessible, distribution lists encapsulate the myriad collective units that exist within an organization. Some lists trace the formal organizational structure, while others correspond to various work groups. Because list names were encrypted in the data I received from InfoCo, it was not possible to distinguish among these different list types. Yet there is good reason to believe that the lists in use at InfoCo primarily reflected the work group structure. There were over 2,300 distribution lists in use during a typical week in this observation period; the mean number of lists to which an employee belonged was 12.2. The number of distribution lists in use far exceeded the number of departments in which the sample of 114 employees worked. Interviews with InfoCo employees further indicated that these lists were used primarily for work groups, especially project teams that spanned formal subunits. A product development manager explained, “I use [distribution lists] for very specific project-related activity. People have gotten so weary of email that we’ve had a push to narrow distribution lists to work-related projects that are active at a given point in time.” A female vice president reported, “The only list I use that isn’t about project-related work is the Women’s Network. The rest are projects.”

In principle, the work group structure could overlap significantly with the formal organizational structure, for example if work groups were entirely nested within the formal subunits. In practice, however, the two measures appeared to reflect non-overlapping dimensions of network range. Moreover, based on a median split of distance in the work group structure (defined below), only 5.2% of dyads in the sample were both proximate in the work group

structure and in the same department. Thus, at least in this setting, distance in the work group structure was relatively independent of distance across formal subunits.

Data – Supplemental Semi-Structured Interviews

To help address the limitations of the archival data sources described above, I conducted supplemental semi-structured interviews with 23 study participants after the restructuring concluded. These individuals were selected from sub-samples of people who experienced high and low levels of uncertainty during the restructuring but remained employed by InfoCo. Legal concerns kept the company from granting me access to those who had exited. Interviews lasted between 30 and 45 minutes and were recorded and transcribed. The purpose of the interviews was to validate the timeline of events, assess the level of uncertainty people experienced, understand how and why people activated their networks during the restructuring, and determine how they used electronic communication media in this organizational setting. I used a software tool – Atlas.ti – to code and analyze the responses. I paid particular attention to the network activation choices described by respondents, coding the kinds of people who were contacted (e.g., same department or different department; shared work group), the resources sought in these interactions (e.g., information, influence, social support), and other factors that promoted or inhibited communication (e.g., normative constraints).

Measures

The response variable was a count of the number of one-to-one email messages exchanged in a given week, t , between a dyadic pair, i and j . Given the conceptual focus on network range – i.e., the diversity of actors to which one is connected – explanatory variables were all expressed as differences or distance between a pair of actors rather than as similarities or proximity. The time-varying indicator variable of range across the formal subunits was: *Different Department_t* (set to

1 if i and j were in different departments in week t and to 0 otherwise). For range across work groups that span the formal organizational structure, I considered the distance between two actors based on the number of email distribution lists to which they both belonged. I weighted this measure in two ways. First, I weighted by list size under the assumption that smaller lists are more likely to reflect meaningful work groups (e.g., a product development team) than very large lists (e.g., all employees in the company or the entire marketing department). Second, given the conceptual focus on work groups that span formal organizational boundaries, I weighted each list by the level of functional diversity it encompassed (Blau 1977).⁸ The resulting measure is a variant of a widely used distance measure: Jaccard's distance (Sneath and Sokal 1973)⁹:

$$Distance\ in\ Work\ Group\ Structure_{i,j,t} = 1 - \frac{\sum_k \frac{s_{i,j} d_k}{N_k}}{\sum_k \frac{m_i d_k}{N_k} + \sum_k \frac{m_j d_k}{N_k} - \sum_k \frac{s_{i,j}}{N_k}}$$

Where: i, j index members of the dyad

k indexes distribution lists

$s_{i,j} = 1$ if i and j belong to list k ; 0 otherwise

$m_i = 1$ if i belongs to list k ; 0 otherwise

$m_j = 1$ if j belongs to list k ; 0 otherwise

$d_k = 1 - \text{sum of squared proportions of each function represented on list } k$

$N_k = \text{size of list } k$

This measure has a theoretical range from 0 to 1. Because the results reported below were robust to the use of alternative distance measures, such as one based on Dice's coefficient (Dice 1945), I report only those based on Jaccard's distance. Finally, the indicator variables *Different Sex* and *Different Ethnicity* reflected range across social groups defined by ascriptive traits.

To identify the effects of uncertainty on network range, I included an indicator for the period of uncertainty, $Uncertainty_t$, and the following interaction terms: $Uncertainty_t \times Different$

⁸Because the lists included all InfoCo employees, the diversity measure was based on eleven functional groups that were represented on lists.

⁹This covariate is mean-centered in the analyses reported below.

Department_t, *Uncertainty_t x Distance in Work Group Structure_t*, *Uncertainty_t x Different Sex*, and *Uncertainty_t x Different Ethnicity*. Positive coefficients for these terms indicate an increase in network range during heightened uncertainty, while negative coefficients suggest a decrease in range. I also included several controls: (1) *Different Location_t*; (2) *Different Salary Grade_t*; (3) *Different Cohort* (i.e., hire dates separated by more than one year); and (4) *Different Age* (i.e., difference of more than three years).

Estimation

I constructed a dyad-level panel data set of messages sent between i and j in week, t . Analyses of such data must contend with the clustering (i.e., non-independence) of observations. Error terms in regression analyses will be correlated across observations, a problem referred to as network autocorrelation. The failure to control for clustering can lead to under-estimated standard errors and over-rejection of hypothesis tests. To address this issue, I followed two different empirical strategies. First, I used a variance estimator that enables cluster-robust inference when there is multi-way clustering (Cameron, Gelbach, and Miller 2011). This situation arises when – as in this study – there is clustering at both the cross-sectional and temporal levels. In the case of two-way clustering, the technique produces three different variance matrices: for the first dimension, for the second dimension, and for the intersection of the two. The first two matrices are added together and third subtracted. In the case of three-way clustering, the analogous technique results in the creation and combination of seven one-way cluster robust variance matrices.¹⁰ This technique is appropriate for the analysis of dyadic network data, including panel data, and

¹⁰Each of the first three matrices clusters in one of the dimensions. Because some observation pairs are in the same cluster in two dimensions, considering only these three matrices would result in double counting. The technique then clusters on the three combinations of two dimensions and subtracts the resulting matrices. This eliminates double counting but does not account for pairs that share the same cluster in all three dimensions. So the seventh matrix, which clusters on pairs sharing the same cluster in all dimensions, is added back (see Cameron, Gelbach, and Miller [2011: 10-11] for a detailed explanation). This approach also controls for potential over- or under-dispersion in the data. I implemented it in STATA using the “clus_nway” script (Kleinbaum, Stuart, and Tushman 2011).

compares favorably in simulation studies to alternative methods, such as the Quadratic Assignment Procedure (Lindgren 2010). Following this approach, and because the response variable was a count of messages sent between dyadic pairs in a given week, I estimated Poisson regressions with standard errors clustered by sender, by receiver, and by week. Second, following prior studies (Mizruchi 1989; Reagans and McEvily 2003), I estimated Poisson regressions with fixed effects for every sender and every receiver in the study. This approach shifts the potentially autocorrelated disturbances out of the residuals and yields consistent and efficient estimates (Mizruchi 1989: 421). It also accounts for all time-invariant, unobserved differences among study participants. Because the two approaches yield results that are substantively interchangeable, I report only the results from the first.

RESULTS

Table 2.1 reports descriptive statistics and a correlation matrix. As expected, there is a negative correlation between messages exchanged and various measures of dissimilarity between dyads (e.g., *Different Department_t*, and *Different Location_t*).

Table 2.2 provides a comparison of aggregate communication patterns between the periods of uncertainty and relative stability. Although there was a slight increase in aggregate communication volume during the weeks of uncertainty, this change was not statistically significant. The proportion of messages sent between colleagues in different departments was 0.48 in the period of uncertainty and 0.43 in the period of relative stability ($p < .001$). This pattern is consistent with Hypothesis 1a – that uncertainty will increase network range across formal subunits. The correlation between *Distance in Work Group Structure_t* and messages exchanged was -0.15 in the period of uncertainty and -0.13 in the period of relative stability. Although the

difference is slight, this pattern is consistent with Hypothesis 1b: that uncertainty will lead to a decrease in range across the work group structure. Consistent with Hypothesis 2a, there was a marginally significant decline in the proportion of messages sent between different-sex colleagues in the period of uncertainty: from 0.43 to 0.39 ($p=.07$). By contrast, there was no significant difference in the proportion of messages sent between different-ethnicity colleagues across the two time periods.

Table 2.3 reports the results of the regression analyses used to formally test Hypotheses 1a and 1b. Model 1 depicts results from the baseline model. *Different Location_t*, *Different Department_t*, and *Distance in Work Group Structure_t* have negative coefficients that are statistically significant, while *Different Ethnicity* has a negative coefficient that is marginally significant.

The negative coefficients for *Different Department_t* and *Distance in Work Group Structure_t* are consistent with prior research indicating a tendency for the formal and quasi-formal structure to importantly enable and constrain network interaction in organizations (Han 1996; Hinds and Kiesler 1995). Unlike prior research, *Different Salary Grade_t* in this setting has a positive and significant coefficient. One possible explanation for the lack of a negative relationship between messages sent and *Different Salary Grade_t* is that the study population was relatively homogeneous in organizational rank.

Table 2.1: Descriptive Statistics and Correlation Matrix

	Mean	S.D.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1) Messages Exchanged _t	0.33	2.40	1.00												
(2) Different Location _t	0.97	0.16	-0.12	1.00											
(3) Different Salary Grade _t	0.75	0.43	-0.00	-0.02	1.00										
(4) Different Sex	0.45	0.50	-0.01	-0.02	0.02	1.00									
(5) Different Ethnicity	0.27	0.44	-0.02	-0.00	-0.05	0.03	1.00								
(6) Different Cohort	0.85	0.36	-0.02	0.03	0.01	-0.00	-0.06	1.00							
(7) Different Age	0.58	0.49	-0.01	-0.01	0.01	-0.00	0.03	0.00	1.00						
(8) Different Department _t	0.95	0.22	-0.31	0.17	0.08	0.01	0.01	0.01	0.00	1.00					
(9) Distance in Work Group Structure _t	-0.00	0.08	-0.14	0.28	0.07	0.01	-0.00	0.11	0.01	0.26	1.00				
(10) Uncertainty _t x Diff. Department _t	0.26	0.44	-0.04	0.03	0.01	-0.01	0.01	0.00	-0.00	0.14	0.09	1.00			
(11) Uncertainty _t x Dist. in Wrk. Grp. Str. _t	0.00	0.04	-0.06	0.06	0.03	0.01	0.00	0.05	0.00	0.12	0.31	0.07	1.00		
(12) Uncertainty _t x Different Sex	0.12	0.33	-0.01	-0.01	0.01	0.41	0.01	-0.00	-0.00	0.00	0.04	0.59	0.02	1.00	
(13) Uncertainty _t x Different Ethnicity	0.08	0.26	-0.01	-0.00	-0.02	0.01	0.47	-0.03	0.01	0.00	0.03	0.45	0.01	0.30	1.00

N=236,122; Number of Dyads = 6,441

Table 2.2: Comparison of Aggregate Communication Patterns across Time Periods

	Period of Relative Stability (Weeks 1-8; 19- 40)	Period of Uncertainty (Weeks 9-18)	t- statistic (p- value)
One-to-One Messages Exchanged per Week	3,819	4,141	-0.63 (0.53)
Proportion of Messages Exchanged between Colleagues in Different Departments	0.43	0.48	-4.19 (0.00)
Correlation between Messages Exchanged and <i>Distance in Work Group Structure_t</i>	-0.13	-0.15	--
Proportion of Messages Exchanged between Different-Sex Colleagues	0.42	0.39	1.85 (0.07)
Proportion of Messages Exchanged between Different-Ethnicity Colleagues	0.20	0.20	0.08 (0.94)

Model 2 includes *Uncertainty_t*, which represents the effects of uncertainty on same department colleagues and has a negative but not significant coefficient. The interaction term associated with Hypotheses 1a, *Uncertainty_t x Different Department_t*, has a positive and significant coefficient (beta=0.228; p<.05). Model 3 instead adds the interaction term associated with Hypothesis 1b, *Uncertainty_t x Distance in Work Group Structure_t*, which has a negative and significant coefficient (beta=-0.493; p<.05). Model 4 includes both interaction terms: the former is slightly more positive (beta=.312; p<.01) and the latter is considerably more negative (beta=-0.901; p<.001). *Uncertainty_t*, which represents same department colleagues at the mean distance in the work group structure, is negative and significant. These results indicate support for Hypotheses 1a and 1b.

Table 2.4 reports the results of the regression analyses used to test Hypotheses 2a and 2b. Model 5 includes *Uncertainty_t*, which represents the effects of uncertainty on same sex colleagues and has a slightly negative but not significant coefficient. The interaction term associated with Hypothesis 2a, *Uncertainty_t x Different Sex*, has a negative and significant coefficient (beta=-0.102; p<.05). Model 5a decomposes *Different Sex* and *Uncertainty_t x Different Sex* into *Both-Female Dyad*, *Both-Male Dyad*, *Uncertainty_t x Both Female Dyad*, and *Uncertainty_t x Both-Male Dyad*. (The reference category is mixed-sex dyads.) In Model 5a, *Uncertainty_t x Both-Female Dyad* is positive and significant (beta=0.250; p<.001), while *Uncertainty_t x Both-Male Dyad* is not significant. Model 6 introduces the interaction term associated with Hypothesis 2b, *Uncertainty_t x Different Ethnicity*.

Table 2.3: Poisson Regression of Messages Exchanged Between Dyads on Covariates – Hypotheses 1a and 1b

Covariates	Model 1: Baseline	Model 2: H1	Model 3: H2	Model 4: H1 + H2
Different Location _t	-0.695** (0.242)	-0.696** (0.243)	-0.694** (0.242)	-0.696** (0.242)
Different Salary Grade _t	0.384*** (0.105)	0.387*** (0.104)	0.383*** (0.105)	0.383*** (0.105)
Different Sex	-0.116 (0.149)	-0.117 (0.148)	-0.116 (0.148)	-0.116 (0.148)
Different Ethnicity	-0.280 [†] (0.169)	-0.278 (0.169)	-0.280 [†] (0.169)	-0.279 (0.169)
Different Cohort	-0.204 (0.209)	-0.203 (0.209)	-0.203 (0.209)	-0.202 (0.209)
Different Age	-0.175 (0.117)	-0.174 (0.117)	-0.176 (0.117)	-0.177 (0.117)
Different Department _t	-2.915*** (0.145)	-2.976*** (0.141)	-2.916*** (0.145)	-2.998*** (0.143)
Distance in Work Group Structure _t	-1.510*** (0.560)	-1.510** (0.558)	-1.371* (0.580)	-1.258* (0.589)
Uncertainty _t		-0.152 (0.101)	-0.077 (0.090)	-0.243* (0.109)
Uncertainty _t x Different Department _t		0.228* (0.098)		0.312** (0.107)
Uncertainty _t x Distance in Work Group Structure _t			-0.493* (0.222)	-0.901*** (0.220)
Constant	1.810*** (0.419)	1.848*** (0.417)	1.832*** (0.418)	1.874*** (0.419)
Chi2	1387	1397	1437	1466
Prob>Chi2	0.000	0.000	0.000	0.000
Number of Observations	236122	236122	236122	236122

[†]p<0.10, * p<0.05, ** p<0.01, *** p<0.001; two-tailed tests; standard errors clustered by sender, receiver, and time – resulting in seven cluster combinations; number of dyads = 6,441.

Table 2.4: Poisson Regression of Messages Exchanged Between Dyads on Covariates – Hypotheses 2a and 2b; Fully Specified Model

Covariates	Model 5: H3a	Model 5a: H3a - decomposed	Model 6: H3b	Model 7: H3a + H3b	Model 8: Fully Specified Model
Different Location _t	-0.695** (0.242)	-0.665** (0.247)	-0.695** (0.242)	-0.665** (0.247)	-0.666** (0.247)
Different Salary Grade _t	0.385*** (0.105)	0.353** (0.108)	0.385*** (0.105)	0.354** (0.108)	0.352** (0.108)
Different Sex	-0.116 (0.149)		-0.117 (0.148)		
Both-Female Dyad		0.515** (0.166)		0.512** (0.166)	0.502** (0.167)
Both-Male Dyad		-0.068 (0.212)		-0.067 (0.212)	-0.063 (0.211)
Different Ethnicity	-0.280 [†] (0.169)	-0.280 [†] (0.178)	-0.243 (0.173)	-0.286 (0.181)	-0.283 (0.181)
Different Cohort	-0.204 (0.209)	-0.231 (0.208)	-0.204 (0.209)	-0.231 (0.208)	-0.228 (0.208)
Different Age	-0.175 (0.117)	-0.159 (0.113)	-0.174 (0.117)	-0.159 (0.113)	-0.162 (0.113)
Different Department _t	-2.915*** (0.145)	-2.894*** (0.153)	-2.916*** (0.145)	-2.894*** (0.153)	-2.976*** (0.152)
Distance in Work Group Structure _t	-1.509** (0.560)	-1.714** (0.600)	-1.510** (0.559)	-1.715* (0.600)	-1.436* (0.589)
Uncertainty _t	-0.006 (0.080)	-0.107 (0.103)	-0.020 (0.085)	-0.078 (0.100)	-0.274* (0.120)
Uncertainty _t x Different Department _t					0.305** (0.108)
Uncertainty _t x Distance in Work Group Structure _t					-0.994*** (0.224)
Uncertainty _t x Different Gender	-0.102* (0.042)				

Table 2.4: Poisson Regression of Messages Exchanged Between Dyads on Covariates – Hypotheses 2a and 2b; Fully Specified Model (continued)

Covariates	Model 5: H3a	Model 5a: H3a - decomposed	Model 6: H3b	Model 7: H3a + H3b	Model 8: Fully Specified Model
Uncertainty _t x Both-Female Dyad		0.250*** (0.058)		0.260*** (0.059)	0.292*** (0.066)
Uncertainty _t x Both-Male Dyad		0.067 (0.060)		0.065 (0.060)	0.050 (0.063)
Uncertainty _t x Different Ethnicity			-0.135 (0.111)	-0.286 (0.181)	-0.149 (0.103)
Constant	1.811*** (0.420)	1.722*** (0.384)	1.815*** (0.416)	1.714*** (0.383)	1.767*** (0.383)
Chi2	1397	1673	1423	1688	1774
Prob>Chi2	0.000	0.000	0.000	0.000	0.000
Number of Observations	236122	236122	236122	236122	236122

†p<0.10, * p<0.05, ** p<0.01, *** p<0.001; two-tailed tests; standard errors clustered by sender, receiver, and time – resulting in seven cluster combinations; number of dyads = 6,441.

Although the coefficient for this term is negative, it is not statistically significant. Model 7 includes both interaction terms and produces comparable results: *Uncertainty_t x Both-Female Dyad* is positive and significant (beta=0.260; $p < .001$), while the other two interaction terms are not significant. Together, these results indicate strong support for Hypothesis 2a and further indicate that the decrease in range across sex lines was driven by an increase in communication among both-female dyads. There is no support for Hypothesis 2b – that uncertainty will lead to a decrease in range across ethnic lines. One explanation for the lack of support for this hypothesis is that there was insufficient variation in ethnicity (84% white) within this study population. Finally, Model 8 includes all interaction terms together and yields similar results: support for Hypotheses 1a, 1b, and 2a but no support for Hypothesis 2b.

Considering that changes in email communication probably represent a conservative indicator of overall shifts in network activation, these effects were sizable: In the period of uncertainty relative to stability, there was a 14% decline in the predicted number of messages exchanged between colleagues in the same department and a 7% increase in the predicted number of messages exchanged between colleagues in different departments. For dyads at the median of *Distance in Work Group Structure_t*, there was a 10% decrease in the predicted number of messages exchanged in the period of uncertainty relative to stability. (There was a 7% predicted increase for dyads at the 5th percentile and an 11% decrease for dyads at the 95th percentile.) There was a 9% increase in the predicted count of messages exchanged between both-female dyads and a 1% decrease in the predicted count of messages exchanged between both-male dyads.

Finally, to understand whether communication patterns reverted to their original state when the uncertainty period ended, I used a three-period model, with interactions for the period

of uncertainty (e.g., $Uncertainty_t \times Different\ Department_t$) and the period after uncertainty (e.g., $Post-Uncertainty_t \times Different\ Department_t$). In the three-period model, $Uncertainty_t \times Different\ Department_t$ was positive and marginally significant (beta=0.207, $p<.10$), and the linear combination of $Uncertainty_t \times Different\ Department_t - Post-Uncertainty_t \times Different\ Department_t$ was positive and significant (beta=0.373, $p<.01$). Similarly, $Uncertainty_t \times Distance\ in\ Work\ Group\ Structure_t$ was negative and significant (beta=-0.767, $p<.05$), and the linear combination of $Uncertainty_t \times Distance\ in\ Work\ Group\ Structure_t - Post-Uncertainty_t \times Distance\ in\ Work\ Group\ Structure_t$ was negative and significant (beta=-1.153, $p<.01$). Finally, $Uncertainty_t \times Both-Female\ Dyad$ was positive and significant (beta=0.379; $p<.05$), and the linear combination of $Uncertainty_t \times Both-Female\ Dyad - Post-Uncertainty_t \times Both-Female\ Dyad$ was positive and significant (beta=0.218; $p<.05$). These results suggest that the effects of uncertainty on network range were transitory rather than sustained.

Supplemental Qualitative Evidence

The qualitative evidence largely corroborates and aids in the interpretation of these results. Of the 23 interviewees, 13 listed specific names of people they contacted during the period of restructuring (rather than describing their network activation choices in more general terms). These individuals listed an average of 5.3 names, of which 4.0 (75%) were people outside of their department and 3.5 (66%) were same-sex colleagues. (It was not feasible in the time available to code people based on their proximity in the work group structure.)

The choice to initiate contact with colleagues in other departments appeared to be motivated by a search for information and influence. A director of product development reported, “When I need to gather intelligence, I try to reach out to somebody in the adjacent unit I work with regularly, someone in sales or customer support (to understand what is happening

externally that is driving the change), someone in strategy or business development (so I can figure out what we're going to do next), and someone in HR (if they are in my trust circle and willing to tell me how things will play out internally." Similarly, a manager in sales support noted, "I tried to figure out what was happening in Marketing, in Sales, and in Product Development. I tried to piece together what senior management was doing and where the company was going based on what I picked up from the different functional areas." With regards to political influence, a sales leader reported, "I found out I was one of two contenders for a position....At that point, it turned into a sales job. I set up meetings with five people I knew would influence the decision." Similarly, a division general manager reported, "I reached out to maybe 10 to 15 people to help me get the position I currently have. I chose people who were generally well thought of and likely to be well positioned in the new organizational structure."

In choosing whom to contact outside of their department, several interviewees sought colleagues to whom they were connected through one or more work groups. A product development director stated, "When I need to gather intelligence, I try to reach out to somebody in my trust circle...someone I've worked closely with on projects." Similarly, a customer support director said, "I go to the people on my teams who I have gone in battle with before."

In addition to activating ties to colleagues in other departments, interviewees also reported curtailing contact with same-department colleagues. Normative constraints on supervisor-subordinate communication partly accounted for this pattern. For example, a vice president of a corporate strategic initiative stated, "If you have direct reports, you can't share information with one that you don't share with the other. So you can't share information with your own staff, but you can with other people you trust. With direct reports, you have to adhere to certain professional standards." Similarly, a divisional leader indicated, "[D]irect line

management did not communicate a whole lot during that time. What they don't get is that when they go silent, it actually ups the level of concern and anxiety.” Finally, the restructuring sometimes created socially awkward situations that created distance between colleagues in the same department. A marketing communications manager reported, “I tried reaching out to my boss, who was eventually let go. He was totally out of the loop: it was painfully obvious he wasn't being consulted on major decisions.”

Most interviewees did not report consciously seeking out colleagues of the same sex or ethnicity. Among those who did was a female product marketing leader, who reported, “If I think about the people I sought out during that time, it was definitely tilted toward women.... I just think that women are more empathetic. You can have better conversations with them. It was conversations like, ‘Can you believe how badly this change was handled?’” Similarly, a female marketing director explained, “When I'm feeling uncertain, I find myself reaching out to other senior women in the organization.... They are the people I am most comfortable with and trust.”

ROBUSTNESS CHECKS

I conducted several robustness checks to address potential alternative explanations for these findings. First, the increase in contact across formal subunits could be explained by anticipated role transitions – for example, a person reaching out to a likely known future supervisor or beginning to perform new job responsibilities prior to changing roles. To account for these transitions, I controlled for three weeks of lagged and leading indicators of departmental affiliations and distance measures, which accounted for seven weeks of role transition, and also included a control for the person's departmental at the end of the observation period. I also estimated models for the subset of dyads that did not make any role transitions. These analyses

produced comparable results to those reported above. Second, I analyzed the content of email subject lines to address the possibility that people somehow suspected their email was being monitored by senior management and shifted their communication patterns accordingly – for example, sending fewer frivolous messages to supervisors or same-department colleagues. I coded messages as frivolous based on their subject lines (e.g., “Beer?” “Play ball!” “Golf,” and “Gasoline Cartoons”). The proportion of such messages did not vary significantly across time periods. Third, to account for the role of competition among actors – for example, a decline in contact among people with comparable skills who are vying for the same job – I constructed an indicator, which was set to 1 for dyads in the same job family. Including this indicator as a control did not materially change the results. Next, given that the analyses reported above are heavily dependent on the (subjective) choice of uncertainty period, I constructed an alternative, continuous measure of uncertainty based on email subject lines. I identified 43 subject line fragments that appeared to be associated with the restructuring event. Examples included: “Organizational announcement,” “Resignation,” “Open Position,” “Global Solution Line,” “Appointed,” and “Departure.” I then calculated for each week the proportion of messages exchanged that included at least one of these fragments and used this continuous measure of uncertainty in the models reported above. Given that the proportion of such messages was highest during Weeks 9 to 18, this analysis produced comparable results as above. Finally, to address the possibility that the use of one-to-one messages masked potential collective network action among subunit members, I estimated versions of the models reported above using all emails. The results reported above were materially unchanged.

DISCUSSION AND CONCLUSION

The goal of this article has been to examine how pre-existing structure – in particular, organizational structure – shapes social capital activation choices during the uncertainty of restructuring. The uncertainty of restructuring exerts two divergent forces on the range of ties that organizational actors activate. On one hand, people tend to activate distant ties because the resources held by distant colleagues are more valuable under conditions of uncertainty (e.g., Burt 2000; Pfeffer 1992). On the other hand, people facing uncertainty tend to activate ties to organizationally proximate or socially similar actors with whom they have a history of trustworthy exchange (e.g., McDonald and Westphal 2003; Mizruchi and Stearns 2001). I argue that these forces are conditioned by the type of social resources that actors seek and by different facets of organizational structure: the formal structure of organizational subunits, the quasi-formal structure of work groups that span formal subunits, and the emergent network (Ibarra 1992a). I first theorize that uncertainty will lead to an expansion in range across formal subunits because people will seek non-redundant information and political influence from colleagues in other departments and because of normative constraints on within-department communication (Friedkin 1982; Klein 1996; Pfeffer 1989). I next argue that, in choosing whom to contact outside of their department, people will tend to turn to colleagues who are proximate in the quasi-structure of work groups that span formal subunits. Because members of these groups are drawn from different formal subunits, they possess non-redundant information and wield distinct sources of political influence. In addition, because there are fewer normative constraints on communication within work groups during restructuring (Balogun and Johnson 2004; Isabella 1990), people will fill the information void in their formal subunits by turning to proximate colleagues in work group structure. Finally, I argue that the uncertainty of restructuring will raise

doubts about actors' self-concepts and their place in the changing social world. These doubts will trigger the process of self-categorization, leading people to assimilate with readily available prototypes and therefore to activate ties to same-sex and same-ethnicity colleagues (Hogg 2000; Hogg and Mullin 1999; Hogg and Terry 2000). Analyses of 40 weeks of email data from a company that underwent a major restructuring provide support for most of these propositions: during the period of heightened uncertainty, there was (1) an increase in range across formal subunits; (2) a decrease in range across work groups that span formal subunits; and (3) a decrease in range across sex lines, which was fueled by an increase in communication between both-female dyads. Although there was also a decrease in range across ethnic lines, this effect was not statistically significant.

Outstanding Questions

I turn next to three questions raised by these findings. First, did network activation choices during the period of restructuring affect individuals' subsequent outcomes? Given the research design, it was not possible to establish a causal link; however, I examined the association between network activation during restructuring and the likelihood of exit from the firm fourteen months after the event. Given that the US economy was in a significant downturn at the time, it is likely – though not known – that many of these exits were involuntary. These results, which are reported in Appendix 2.C, suggest that individuals who sent more messages than predicted by a baseline model to colleagues in different departments, to colleagues of the opposite sex, and to colleagues of a different ethnicity had lower conditional log-odds of exit. This association should, however, be considered preliminary because other unobserved factors (e.g., external job prospects) may have influenced exit decisions. Second, the focus on a relatively senior employee population in a single organization raises the question about the extent to which these findings

can be generalized to other settings. Although the evidence in Appendix 2.B suggests that lower-ranking employees experienced even greater uncertainty than those involved in this study, further work is needed to establish that these same patterns hold across different employee populations and other types of organizations. Third, the focus on three facets of organizational structure raises questions about the intersections among these dimensions. For example, in choosing which ties to activate outside the formal subunit, do people tend to favor same-sex colleagues in other units? I tested for this possibility in supplemental analyses that included relevant three-way interaction terms (e.g., *Uncertainty_t × Different Department_t × Different Sex*). None of the three-way interactions was statistically significant.

Limitations and Directions for Future Research

As noted above, this study had certain limitations, which also suggest avenues for future research. First, it was not possible in this setting to analyze the content of emails exchanged; inferences about the kinds of resources that people exchanged were therefore drawn primarily from the supplemental qualitative evidence. Future studies could benefit from using content analysis techniques that can discern broad patterns in email data – for example, messages exchanged for instrumental versus expressive purposes – while still preserving confidentiality (see, for example, Aral and Van Alstyne [2011]). Second, because the baseline period prior to restructuring was relatively short, this study could not account for the role of pre-existing network structure in influencing activation choices (Gargiulo and Benassi 2000; Hurlbert, Haines, and Beggs 2000; Uehara 1990). Future research could profitably extend the baseline period before an uncertainty-producing shock. Finally, this study was based on just one form (emails) of employee communication – albeit one that is correlated with face-to-face and telephone modes of interaction (Kleinbaum, Stuart, and Tushman 2008). Still, a useful next step

would be to explore differences in reactions to uncertainty across a wider range of media – such as unscheduled meetings, phone calls, and text messages.

Contributions

These limitations notwithstanding, this study make three core contributions. First, it sheds new light on the dynamics of social capital activation. Prior work in this tradition has examined the job searches through which people gain entry into organizations (Bian 1997; Lin, Ensel, and Vaughn 1981; Marsden and Hurlbert 1988; Wegener 1991). This study instead exposes how actors already embedded in an organization make activation choices. Whereas Hurlbert, Haines, and Beggs (2000) highlighted the importance of pre-existing network structure – in particular, density and composition – in influencing whom people turned to following an unsettling event (Hurricane Andrew), this study clarifies the role of organizational structure in conditioning network activation choices. It reveals, for example, that the uncertainty of restructuring led to an increase in range across one dimension of structure (formal subunits) and a decrease in range across another (work groups that span the formal structure). Moreover, these findings indicate that organizational norms – for example, those that govern supervisor-subordinate interaction – must join the list of previously identified factors – such as a lack of trust (Smith 2005) or interpersonal affect (Casciaro and Lobo 2008) – that are known to drive a wedge between the actual and potential resources actors obtain through networks. In this setting, supervisors sought to maintain professionalism by not divulging information to just a subset of their subordinates. At the same time, subordinates felt inhibited in communicating with supervisors whose own career outcomes were unclear. The net effect was a constriction of contact between subordinates and supervisors.

Second, this study has important implications for research on organizational structure and performance in turbulent times (Davis, Eisenhardt, and Bingham 2009; Krackhardt and Stern 1988; Lin et al. 2006; Rindova and Kotha 2001). At the organizational level, Krackhardt and Stern (1988) argue that the structure of internal friendship ties within organizations can influence their ability to survive crisis situations. In particular, firms with a high ratio of cross- to within-subunit friendship ties – i.e., a high External-Internal (E-I) Index – were more effective at surviving crises in a simulation game. Findings from the present study suggest the need to complicate this account. Whereas the experimentally manipulated organizations created by Krackhardt and Stern (1988) varied in the *structure* of intraorganizational ties, this study suggests the need to also consider network *action*, in the form of activated networks. In particular, it may be inadequate to consider a single E-I index, which remains static over time and determines an organization's ability to withstand turbulent times. Instead, we must consider at least two forms of the E-I index – one based on formal subunits and one based on other work groups. Conditions of uncertainty can cause the E-I index for formal subunits to increase and the E-I index for work groups to decrease. It remains to be explored how these shifts in E-I index influence an organization's ability to survive uncertain crises. At the individual level, Soda and Zaheer (forthcoming) examine the performance implications of inconsistencies between an actor's informal network and her position in the formal authority and workflow structure of the organization. Although their study highlights the interplay of formal structures and social networks, it also takes a static view of networks. The present study reveals that, during critical junctures in careers – such as restructuring – the consistency between networks and different organizational structures can itself shift as people seek social resources.

The findings from this study also contribute to research on restructuring and inequality (Acker 1992; Acker 2006; Dencker 2008; Parks-Yancey 2004). The empirical evidence on restructuring and sex-based inequality is mixed. A longitudinal analysis of personnel records from a Fortune 500 manufacturing firm finds, for example, that female promotion rates were higher than male promotion rates during periods of restructuring, even though few females transitioned into upper management positions (Dencker 2008). Other research suggests that males achieve better career outcomes than females following organizational restructuring (Acker 2006; Spalter-Roth and Deitch 1999). Differences in social capital activation may account for these divergent findings. Female survivors of restructuring, for example, stand to benefit from borrowing social capital resources from well-positioned male survivors; however, cultural factors and gender differences can negatively affect their ability to gain access to these resources (Parks-Yancey 2004). The findings from this study suggest another possible mechanism that limits access to valuable social resources: the tendency for female colleagues to preferentially activate ties to same-sex colleagues during the uncertainty of restructuring. It remains to be explored the extent to which this pattern generalizes across organizational settings and, if so, how it affects subsequent career outcomes.

Finally, the study makes a methodological contribution: suggesting a novel data source that can be used to “dust the fingerprints of informal organization” (Nickerson and Silverman 2009: 538). This study uses an affiliation matrix derived from email distribution lists to map the distance between actors in the quasi-structure of work groups that span formal subunits (see Liu, Srivastava, and Stuart [2012] for an illustration of how email lists can be used to construct an intraorganizational ecology of attainment). Given the widespread availability of email distribution lists, this data source and the measure used in this study have wide applicability.

In summary, this study underscores the need to examine how pre-existing social structure intersects with actors' choices about how to use the network resources accessible to them. It also deepens our understanding of the role of uncertainty as an engine of network change during transformative events such as an organizational restructuring.

CHAPTER 3: SITUATIONAL UNCERTAINTY AND NETWORK ACTIVATION IN ORGANIZATIONS

INTRODUCTION

Organizational theorists have long studied events – such as restructuring, mergers, and senior leadership transitions – that transform intraorganizational social structure (Burkhardt and Brass 1990; Gulati and Puranam 2009; Shah 2000; Tsai 2000). Such periods of organizational change often produce high levels of uncertainty for organizational actors, for example, about how their status, resources, or structural position will change. Uncertainty can, in turn, trigger the mobilization of social resources (McDonald and Westphal 2003; Mizruchi and Stearns 2001; Pescosolido 1992) – such as information, influence, and social support (Lin 2001) – that are accessible through interpersonal networks. Just because valuable resources are available through social relations does not, however, always mean they will be accessed. Trust-based barriers (Smith 2005), interpersonal affect (Casciaro and Lobo 2008), and language incompatibility (Mouw 2009) all can constrain the set of contacts people turn to and the nature of resources they obtain. That is, in many situations, people activate only a subset of the relations to which they have access.

Research on strategic issue identification has meanwhile examined how organizational actors interpret and act upon uncertain situations they encounter in their environments (Chattopadhyay, Glick, and Huber 2001; George et al. 2006; Ocasio 1995). A core insight is that people tend to view situational uncertainty through the lens of threat or opportunity (Dutton and Jackson 1987; Jackson and Dutton 1988). In many cases, the same situation can produce different forms of uncertainty for different actors. For example, organizational restructuring can produce threat-related uncertainty for some actors (e.g., potential downward mobility within a consolidating structure) and opportunity-related uncertainty for others (e.g., the prospect of

filling a job role that will likely be vacated). To whom do organizational actors turn when they face these different forms of uncertainty?

This article brings together insights from the social capital and strategic issue identification traditions to inform our understanding of the cognitive forces that drive network activation under uncertainty. These choices are important to understand because they can have significant consequences for individual attainment (Seibert, Kramer, and Liden 2001), particularly during times of organizational change when power and resources are in flux (Pfeffer 1989; 1992). To the extent that they cause the formal and informal organization to diverge during times of change, these choices can also have implications for the performance of the organization as a whole (Gulati and Puranam 2009).

In the remainder of this article, I derive propositions about network activation in uncertain situations of threat and opportunity. Next I report on two experiments, which build on an established protocol (Smith, Menon, and Thompson 2012) and help evaluate these propositions. The studies use a 2x2 factorial design and involve 158 executives in a non-profit health care organization and 129 employed participants in an on-line subject pool. The experimental set-up allows for causal identification of situational uncertainty on network activation. Moreover, the use of samples of working professionals, rather than undergraduate subjects, enhances external validity.

THEORY

Situations of Uncertain Threat and Opportunity

One of the most common lenses through which people view uncertain situations is threat / opportunity. Situations as wide-ranging as new competitor entry, technological disruption, legal

and regulatory change, and restructuring are interpreted through this filter (Dutton and Jackson 1987; Gilbert 2006; Jackson and Dutton 1988). Some situations – such as macroeconomic boom or slump – may be viewed in the same way by all actors, while others – such as downsizing or reorganization – may be viewed as a threat by some and an opportunity by others. I turn next to a discussion of three social theories that inform expectations about how uncertain threats and opportunities influence the activation of social capital.

Threat-Rigidity

In the original conceptualization of threat-rigidity theory (Staw, Sandelands, and Dutton 1981), actors are assumed to perceive threats negatively, with an expectation of loss and limited freedom to take action, and opportunities positively, with an expectation of gain and considerable freedom to maneuver (Jackson and Dutton 1988; Nutt 1984). This view further assumes that threats lead to a constriction of information processing and the focusing of attention on the proximate organizational environment. By contrast, opportunities lead to an expansion of information processing and the focusing of attention on the distal environment (Chattopadhyay, Glick, and Huber 2001; Thomas, Clark, and Gioia 1993).

Mixed empirical support for this original conceptualization of threat-rigidity (Gladstein and Reilly 1985) has led organizational theorists to suggest disaggregating threat / opportunity into two separate dimensions: the gain or loss of tangible resources and having agency or feeling constrained to take action (George et al. 2006). To put it differently, uncertain situations can pose a threat in two distinct ways: if people believe they can lose tangible resources or if they think they have limited influence over their fate. Similarly, uncertain situations can present an opportunity if people believe they can gain tangible resources or if they think they have freedom to take action. The revised articulation of threat-rigidity theory suggests that its predictions only

operate in the second dimension – i.e., whether a person feels a sense of agency or instead feels constrained.

This version of threat-rigidity theory has clear implications for social capital activation in uncertain situations. For example, if people seek less information when they feel constrained than when they have agency, they will activate fewer ties for purposes of information gathering in the former case. Empirical support for this proposition comes from a management simulation exercise. Participants who experienced threat reduced their level of information processing and group interaction (Gladstein and Reilly 1985). Similarly, if people are more likely to search for information in the proximate, rather than distal, environment when they feel constrained than when they have agency, then the former situation will lead them to activate a lower proportion of ties to organizationally distant colleagues (e.g., those in the different departments or functions). Thus, threat-rigidity theory predicts:

Hypothesis 1: Relative to uncertain situations in which organizational actors have agency to maneuver, situations in which they feel constrained will lead them to activate fewer ties.

Hypothesis 2: Relative to uncertain situations in which organizational actors have agency to maneuver, situations in which they feel constrained will lead them to activate a lower proportion of organizationally distant ties.

Reactance

Reactance theory suggests that, when they feel constrained to take action, people respond – at least initially – by seeking personal mastery over the situation (Brehm 1966; Taylor 1983;

Wicklund 1974). Reactions to diminished control occur in stages, with people first attempting to regain a sense of mastery and then moving to a state of “learned helplessness” if these efforts fail (Wortman and Brehm 1975). This two-stage pattern of response is also thought to occur when organizational situations constrain an actor’s choices (Greenberger and Strasser 1986). An important way in which people seek mastery over a situation is through information seeking (Fiske and Dépret 1996), which can trigger network activation as people reach to social relations for novel information. Thus, reactance theory leads to the opposite prediction (relative to threat-rigidity) about the size of networks activated when people have agency or experience constraint:

Hypothesis 3: Relative to uncertain situations in which organizational actors have agency to maneuver, situations in which they feel constrained will lead them to activate more ties.

Reactance theory does not directly address the question of what kinds of information people will seek as they gain mastery over a situation. It therefore does not offer predictions about the proportion of ties activated that are organizationally distant. It does, however, suggest that individuals can vary in their responses to situations of constraint. In particular, a well-established individual difference construct – internal / external locus of control (Rotter 1954; 1966) – is thought to moderate these responses. Individuals with an internal, rather than external, locus of control believe they have mastery over the events they experience. They think that their own actions – rather than the actions of others, fate, or chance – primarily determine their outcomes, including workplace outcomes (Spector 1988). When confronted with situations where they feel constrained, such individuals can be expected to expend even greater effort to

regain a sense of mastery and to respond by initiating social contact (Ng, Sorensen, and Eby 2006). Thus, reactance theory further suggests:

Hypothesis 4: The propensity for actors to activate more ties when they feel constrained (rather than when they have agency) will be amplified for those with an internal, rather than external, locus of control.

Loss Aversion

Loss aversion pertains to uncertain threats or opportunities that involve potential loss or gain of tangible resources or status. It suggests that attitudes and behavior involving risk are based not only on the expected returns of a decision but also on where the decision outcome stands relative to a predetermined reference point in the mind of the decision maker (Kahneman and Tversky 1979; Tversky and Kahneman 1990). The theory contends that people often prefer to avoid losses rather than achieve gains. This well-documented empirical pattern does not only pertain to economic decisions; it also applies in situations of potential gain or loss in status or resources. Recent experimental evidence suggests that people expend greater effort to avoid status losses than to achieve status gains (Pettit, Yong, and Spataro 2010). To put it differently, organizational actors can be expected to work harder to maintain the standing they have already achieved, but which is at risk, than to strive for an uncertain improvement in their standing. Because social capital activation takes effort, and because social connections are potential conduits to resources, the threat of losing tangible resources or status will lead to the activation of a larger network than will the opportunity to gain tangible resources or status. Thus, loss aversion predicts:

Hypothesis 5: Relative to uncertain situations in which actors could potentially gain tangible resources, situations in which they could potentially lose tangible resources will lead them to activate more ties.

Potential losses can also accelerate information processing and trigger problemistic search (Kahneman 1973; March and Simon 1958). In particular, losses shift attention toward novel or risky solutions and away from well-learned routines. In deciding which network ties to activate, organizational actors facing a potential loss can be expected to turn their attention toward the distal environment. Moreover, organizationally distant ties – e.g., to colleagues in other departments or functions – are more likely to be weak ties, which can be sources of novel and valuable information under conditions of uncertainty (Friedkin 1982). At the same time, a variety of factors – e.g., divergent interpretive schemes (Dougherty 1992), inter-unit competition (Tsai 2002), and incompatible language systems (Bechky 2003) – make it especially challenging to activate organizationally distant ties. If prospective loss leads people to expend greater effort, then they are more likely to incur the costs of cross-departmental network activation. Thus, I expect:

Hypothesis 6: Relative to uncertain situations in which actors could potentially gain tangible resources, situations in which they could potentially lose tangible resources will lead them to activate a greater proportion of organizationally distant ties.

STUDY 1

Research Setting and Study Participants

The study sample comprised employees of a leading non-profit health care company who participated in a custom (i.e., company-specific) executive education program at an East Coast business school. The organization employed over 50,000 individuals. All current program participants (63 individuals) and alumni of the program (188 individuals) were invited to participate. The program had been running for four years, with approximately 60 people per cohort. I introduced the research study to current participants at the end of one of their on-campus sessions and invited alumni to participate through an email communication.

The response rate for current participants was 82.5%, while that for alumni was 56.4%. The total response rate was 62.9% (N=158). The resulting sample had the following characteristics: mean age – 50.4 years (standard deviation, 6.17); mean years of work experience – 25.4 years (standard deviation, 7.59); proportion female – .468; proportion White – .722; proportion Black / African American – .089; proportion Asian – .120; proportion Hispanic / Latino – .038; proportion born outside the US – .158; proportion now married – .785; proportion never married – .095; and proportion working in a small office (i.e., less than 500 employees) – .392.

For at least three reasons, this sample was well-suited to the objectives of this study. First, it included professionals with pre-existing workplace networks. Moreover, a majority of subjects completed the study in the course of their day-to-day jobs, rather than during a classroom exercise. Thus, this sample afforded a more realistic picture of network activation in organizational settings than could be achieved in a typical laboratory study. Second, because all respondents worked in the same company, this design implicitly controlled for organization-level

sources of variation, such as norms governing workplace interaction. Finally, because the sample included long-tenured employees who had experienced a great deal of organizational change, it was possible to construct experimental scenarios to which they could easily relate and about which they could respond based on past experience.

Procedure

Participants were randomly assigned to one of four conditions: (1) loss – constrained; (2) loss – agency; (3) gain – constrained; and (4) gain – agency. I sent them an email with a link to one of four on-line surveys (depending on the condition to which they were assigned). I instructed them to click on the link when they were alone, free from distractions, and had at least 10-15 minutes to devote to the exercise. I also indicated that the exercise involved listening to an audio clip and that they should turn the sound up on their speakers before beginning.

The first section of the survey included questions about their employment history (e.g., years of work experience), role within the organization (e.g., individual contributor, manager, middle manager, executive), and size of the local office in which they work. The manipulation came next. I asked subjects to imagine a hypothetical situation playing out in their organization. They first listened to a voicemail recording of an actor playing the part of the company's CEO and describing an impending organization-wide change. They had the option to rewind or replay the recording as many times as they wished. In addition, I provided them with a transcript of the recording. Next they read details about how the organizational change could potentially affect them personally. In particular, they read a summary of a hypothetical conversation they had with a trusted colleague who was well placed in the organization and who had been a reliable source of information in the past. See Table 3.1 for an overview of the manipulation and the Appendix

3.A for the complete text that was used. After learning about this hypothetical situation, subjects were asked how they interpreted the situation (see manipulation checks).

Table 3.1: Overview of Manipulation

	Loss	Gain
Agency	Uncertain Threat of Downward Mobility Freedom to Shape Job Role and Potential to Influence Decision Outcome	Uncertain Opportunity for Upward Mobility Multiple Available Job Roles and Considerable Freedom to Choose Among Them
Constrained	Uncertain Threat of Downward Mobility Limited Influence over Job Role or Decision Outcome	Uncertain Opportunity for Upward Mobility One Available Job Role and Limited Influence over Decision Outcome

The network activation questions came next in the survey. I gave them the following instructions: “Most people discuss important matters, such as the situation just described, with others within and outside their organization. In the boxes below, please list the initials of the people with whom you would discuss this situation.” Then I asked two standard name generators (Burt 1984): “Who are the people within [Company] with whom you would discuss this situation?” and “Who are the people outside [Company] with whom you would discuss this situation?”

Because prior research has shown that – in self-administered web surveys – the number of names a respondent provides can be especially sensitive to question wording (e.g., “list up to ten contacts”) and even display format (i.e., the number of text boxes shown) (Vehovar et al. 2008), I did not prime subjects with a particular number of names to provide. Instead, I programmed the survey to dynamically adjust the number of boxes displayed (i.e., one box was initially displayed per question; once subjects began typing in that box, another box appeared below). Although subjects were not told of the limit, they could in practice enter up to thirteen

initials per question (or 26 initials in total). Only four respondents (2.5% of subjects) reached either of the two name limits. Following the name generators were a series of name interpreters about each contact listed, including one about organizational distance (five point scale, ranging from “same department, function, or operating unit” to “unrelated department, function, or operating unit”). Finally, the last section of the survey included questions about the respondent’s own background (e.g., sex) and personal characteristics (described in greater detail below).

Manipulation Checks

I included three manipulation checks: (1) perceived uncertainty about the situation; (2) perceived constraint or agency over the situation; and (3) perceived gain or loss. For perceived uncertainty, I adapted four items used in prior research (Caplan et al. 1975): “Based on what you have learned so far about this situation, how certain are you about...” (1) “...what your specific job responsibilities will be six months from now?” (2) “...what your future career picture in this organization looks like?” (3) “...how much the financial rewards you can expect to receive will change?” and (4) “...how much your status in the organization will change?” Responses could range from 1 (“Not at all certain”) to 4 (“Very certain”). I combined these items into a composite measure of perceived uncertainty ($\alpha = 0.84$), which could range from four to sixteen. The mean of this composite measure was 6.60 (standard deviation of 2.63), with 89.2% of subjects perceiving the situation as more uncertain than certain (i.e., mean of the composite measure less than or equal to 10). There were no significant differences in perceptions of uncertainty across the four conditions (mean difference between loss and gain conditions of .537 (t statistic=1.28, $p=.202$); mean difference between the agency and constrained conditions of .094 (t statistic=.223, $p=.824$).

For perceived agency or constraint, I adapted four items from prior research (Pearlin and Schooler 1978): “Based on what you have learned so far about this situation and your expectations about how it might play out, how likely is it that...” (1) “...you will be able to control what happens to you next in the organization?” (2) “...what happens to you next in the organization depends mostly on what you do?” (3) “...you will not be able to influence organizational decisions that relate to you?” and (4) “...you will have the freedom to choose or design the job role you want?” Responses could range from 1 (“Very unlikely”) to 4 (“Very likely”). Reverse coding the third item, I constructed a composite measure ($\alpha = .78$), which could range from 4 to 16 (mean of 10.41; standard deviation of 2.49). Subjects in the agency condition perceived having significantly more influence over the situation than those in the constraint condition; the mean difference was 1.25 (t statistic=3.24; $p=.002$). There were no significant differences in perceived agency or constraint between respondents in the gain and loss conditions.

Finally, for perceived gain or loss, I adapted four items used in prior research (Highhouse, Mohammed, and Hoffman 2002): “Based on what you have learned so far about this situation and your expectations about how it might play out, how likely is it that...” (1) “...the situation will result in a successful outcome for you?” (2) “...you may lose from this situation and are unlikely to gain?” (3) “...you may gain in this situation and are unlikely to lose?” and (4) “...there will be personal loss for you in this situation?” Responses could range from 1 (“Very unlikely”) to 4 (“Very likely”). Reverse coding the second and fourth items, I constructed a composite measure ($\alpha = 0.86$), which could range from 4 to 16 (mean of 10.84; standard deviation of 2.41). Respondents in the gain condition perceived significantly more potential gain in the situation than those in the loss condition; the mean difference was 2.98 (t statistic=9.85;

$p=.000$). Respondents in the constrained condition perceived somewhat less gain than those in the agency condition; however, this difference was not statistically significant. Overall, the manipulation checks indicated that participants' perceptions of the hypothetical situations were consistent with those intended in the study design.

Response Variables

For Hypotheses 1, 3, 4, and 5, the response variable was the number of ties a person activated. I considered the total number of ties, as well as the number activated within the organization and outside the organization. For Hypotheses 2 and 6, the response variable was the proportion of within-organization ties activated that were organizationally distant. I considered a tie organizationally distant if a respondent identified a contact as being at least a three on the five point organizational distance scale (i.e., “different but somewhat related...”, “different but loosely related...”, or “different and unrelated department, function, or operating unit”). I discuss below the robustness of reported findings to alternative measures of organizational distance.

Explanatory Variables

To assess the main effects of the treatments, I used two indicator variables – *Loss* and *Constrained*. For Hypothesis 4, which involved internal versus external locus of control, I used twelve items from a validated and widely used scale that is adapted to workplace settings (Spector 1988): (1) “A job is what you make of it;” (2) “On most jobs, people can pretty much accomplish whatever they set out to accomplish;” (3) “If employees are unhappy with a decision made by their boss, they should do something about it;” (4) “Making money is primarily a matter of good fortune;” (5) “Most people are capable of doing their jobs well if they make the effort;” (6) “Promotions are usually a matter of good fortune;” (7) “Promotions are given to employees who perform well on the job;” (8) “To make a lot of money, you have to know the right people;”

(9) “It takes a lot of luck to be an outstanding employee on most jobs;” (10) “People who perform their jobs well generally get rewarded for it;” (11) “Most employees have more influence on their supervisors than they think they do;” and (12) “The main difference between people who make a lot of money and people who make a little money is luck.” Reverse coding items 4, 6, 8, 9, and 12, I constructed a composite work locus of control measure ($\alpha = .716$). After centering this measure, I interacted it with one of the treatment indicators: *Constrained x Work Locus of Control*.

Finally, I tested the robustness of the findings to the inclusion of various control variables: age, age-squared, sex (indicator set to 1 for female), ethnicity (indicators for White, Black, and Asian, with Hispanic / Latino and Other serving as the reference category), country of origin – ex-US (indicator set to 1 for subjects born outside the US), marital status (indicators for now married and never married, with widowed, divorced, or separated serving as the reference category), past uncertainty experience (indicator set to 1 for subjects who reported “having experienced a period of organizational change that was similar to the scenario presented in this exercise in terms of its potential implications for you”), and small office (to account for the availability of contacts in the subject’s work setting; this was an indicator set to 1 for subjects whose primary work location included less than 500 employees). Because the inclusion of these variables had no material effect on the results reported below, I only report the results of models that include treatment effects and no control variables.

Estimation

For Hypotheses 1, 3, 4, and 5, for which the response variable is a count of the number of ties activated, I used the Poisson Quasi-Maximum Likelihood (PQML) estimator. This estimator is consistent so long as the conditional mean is correctly specified; it makes no assumptions about

the conditional variance or distribution of the data (Wooldridge 1997). For Hypotheses 2 and 6, for which the response variable is a proportion, I employed the fractional logit estimator (Papke and Wooldridge 1996). In all cases, inferences were based on robust standard errors.

Results

Table 3.2 reports descriptive statistics and a correlation matrix. Although I used block random assignment to the experimental conditions, the number of subjects per cell varied based on response rates to the survey. 54% of respondents were assigned to the loss (rather than gain) condition, while 51% of respondents were assigned to the constrained (rather than agency) condition. Across all four conditions, subjects listed a mean of 7.06 contacts; 29% of within-organization ties were organizationally distant. 75% of respondents reported having experienced a situation like the one described in the manipulation at least once in the past.

I first report the results pertaining to threat-rigidity theory: that uncertain situations in which actors feel constrained will lead to the activation of fewer ties (H1) and to a lower proportion of organizationally distant ties (H2) than uncertain situations in which actors have agency. The Poisson QML regression of ties activated on *Constrained* was not significant ($\chi^2(1)=0.08$, $p=0.782$). Similarly, the fractional logit regression of the proportion of organizationally distant ties on *Constrained* was not significant ($\chi^2(1)=2.20$, $p=.138$). Thus, neither Hypothesis 1 nor Hypothesis 2 was supported.

Table 3.2: Descriptive Statistics and Correlation Matrix – Study 1

	Mean	S.D.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
(1) Ties Activated	7.06	4.67	1.0														
(2) Loss	0.54	0.50	0.2	1.0													
(3) Constrained	0.51	0.50	-0.0	0.0	1.0												
(4) Proportion Org. Distant	0.29	0.33	0.2	0.2	0.1	1.0											
(5) Age	50.38	6.17	-0.0	0.1	-0.0	-0.2	1.0										
(6) Female	0.47	0.50	0.0	-0.0	0.0	0.1	0.1	1.0									
(7) White	0.72	0.45	0.1	0.1	-0.0	-0.1	0.2	-0.1	1.0								
(8) Black / Af. Amer.	0.09	0.29	-0.0	0.0	0.1	0.1	-0.0	-0.0	-0.5	1.0							
(9) Asian	0.12	0.33	-0.1	-0.1	0.0	0.0	-0.2	0.1	-0.6	-0.1	1.0						
(10) Born – Ex US	0.16	0.37	0.1	-0.1	0.0	-0.0	-0.2	0.0	-0.3	0.0	0.3	1.0					
(11) Now Married	0.78	0.41	-0.1	-0.1	0.0	-0.2	-0.1	-0.1	-0.0	0.0	0.1	0.1	1.0				
(12) Never Married	0.09	0.29	0.2	0.1	-0.0	0.3	0.0	0.0	0.1	-0.0	-0.1	-0.0	-0.6	1.0			
(13) Past Experience	0.75	0.43	0.1	-0.2	0.1	-0.1	0.1	0.2	0.0	0.1	-0.1	-0.1	-0.1	-0.0	1.0		
(14) Small Office	0.39	0.49	-0.2	0.0	0.0	0.0	-0.0	-0.1	-0.1	-0.0	0.1	-0.0	-0.1	0.0	-0.1	1.0	
(15) Work Locus of Control	0.00	6.00	0.1	0.1	-0.1	0.0	0.1	-0.1	0.1	-0.1	-0.2	-0.1	-0.1	0.0	-0.1	-0.2	1.0

N=158

I next report the results for hypotheses derived from reactance theory: that uncertain situations in which actors feel constrained will lead to the activation of more ties (H3) than uncertain situations in which they have agency and that the propensity for actors to activate more ties when they feel constrained will be amplified for individuals with an internal, rather than external, locus of control (H4). As noted above, the Poisson QML regression of ties activated on *Constrained* was not significant, providing no support for Hypothesis 3. When *Constrained*, *Work Locus of Control*, and *Constrained x Work Locus of Control* were all included, the model was significant ($\chi^2(3)=8.75$; $p=0.033$). Neither main effect – *Constrained* ($\beta = -0.036$, $p=0.727$) and *Work Locus of Control* ($\beta = -0.016$, $p=.133$) – was significant; however, the interaction term, *Constrained x Work Locus of Control*, was both positive and significant ($\beta = 0.045$, $p=0.004$). Figure 3.1 depicts the magnitude of this effect using a median split of the sample on the composite internal locus of control measure. Those in the lower half of the distribution activated 7.82 ties under conditions of agency and 6.42 ties under conditions of constraint (i.e., 18% fewer ties in constraint than in agency), while those in the upper half of the distribution activated 6.50 ties under conditions of agency and 7.84 ties under conditions of constraint (i.e., 21% more ties in constraint than in agency). Thus, Hypothesis 4 was supported.

Finally, I report results pertaining to the predictions of loss aversion: that uncertain situations involving loss will lead to the activation of more ties (H5) and a greater proportion of organizationally distant ties (H6) than those involving gain. The Poisson QML regression of ties activated on *Loss* was significant ($\chi^2(1)=5.05$, $p=0.025$), yielding a positive coefficient for *Loss* of 0.221. Figure 3.2 depicts the magnitude of this effect: the mean of ties activated in the gain condition was 6.23, while the mean in the loss condition was 7.78 (i.e., 25% more ties in loss than in gain). Thus, there was support for Hypothesis 5.

**Figure 3.1: Ties Activated –
Agency / Constrained x Locus of Control (Study 1)**

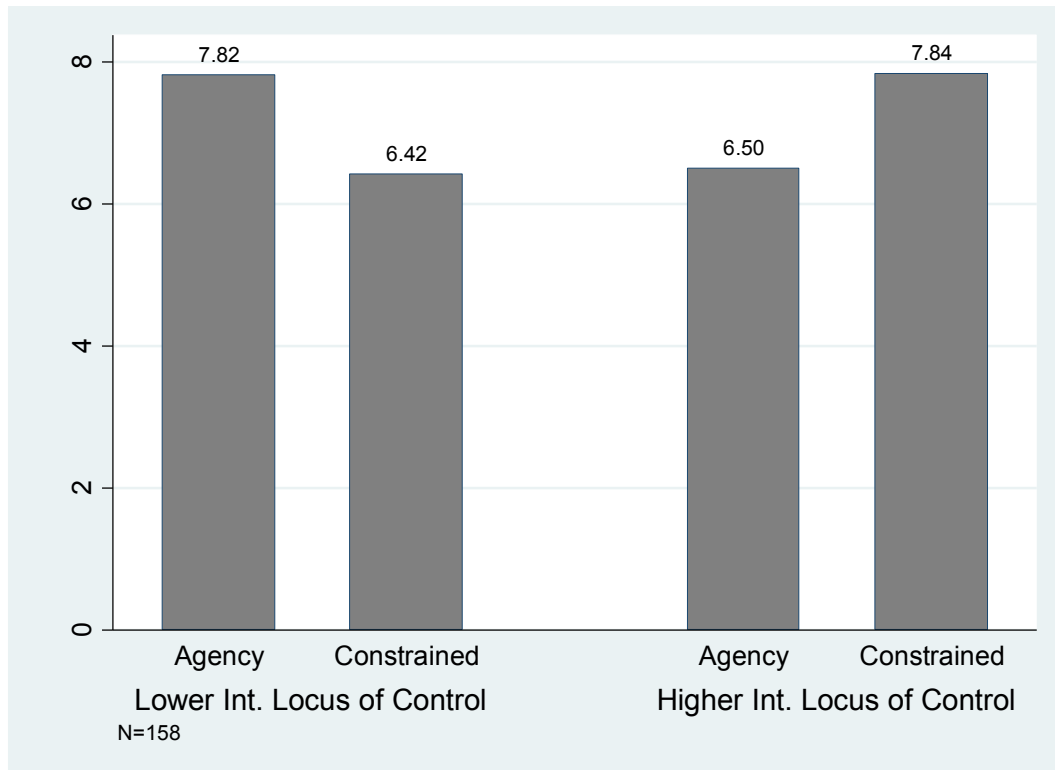
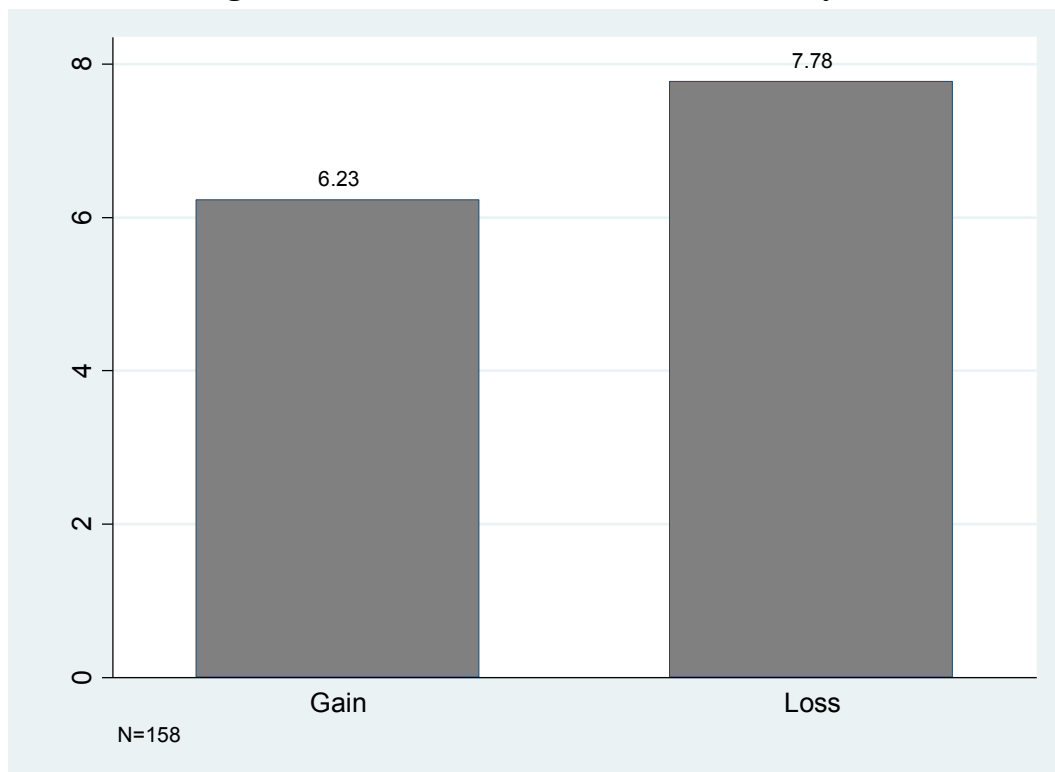


Figure 3.2: Ties Activated – Gain / Loss (Study 1)

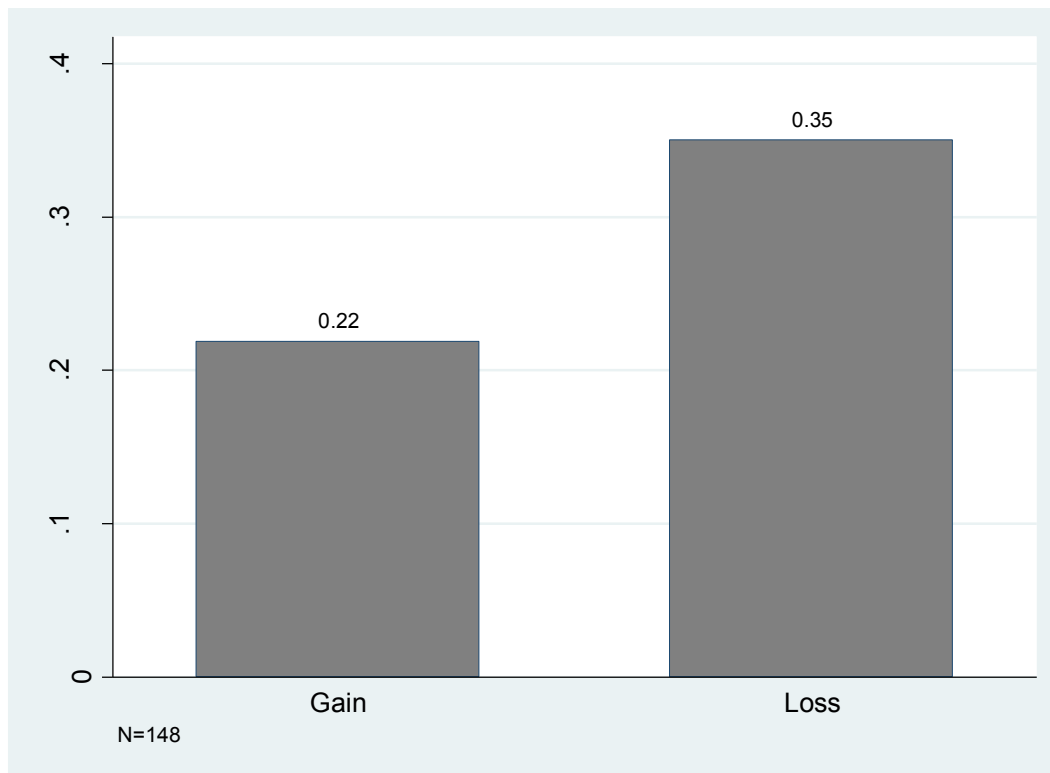


The fractional logit regression of proportion of organizationally distant ties activated on *Loss* was significant ($\chi^2(1)=6.36, p=0.012$) and resulted in a coefficient for *Loss* of 0.653. Figure 3.3 shows the size of this effect: 22% of ties activated by subjects in the gain condition were organizationally distant, while 35% of ties activated by subjects in the loss condition were organizationally distant. Because the designation of a tie as organizationally distant was somewhat arbitrary (i.e., at least a three on a five point scale of organizational distance), I implemented an alternative analytical approach as a robustness check. Using ordinary least squares, I regressed the mean organizational distance of ties activated on *Loss*. The results (available upon request) were comparable – i.e., under conditions of loss, the mean organizational distance of ties activated was significantly greater than under condition of gain. These results lend support for Hypothesis 6.

Discussion

Study 1 indicated no support for the predictions derived from threat-rigidity theory. There was conditional support for the reactance theory: subjects with a high internal locus of control activated more ties under conditions of constraint than when they had agency, while subjects with a low internal locus of control activated more ties when they had agency than when they felt constrained. Finally, the predictions derived from loss aversion were both supported: conditions of loss led people to activate more ties and a greater proportion of organizationally distant ties than did conditions of gain.

The lack of support for threat-rigidity theory and the conditional support for reactance theory may be a function of the sample of senior executives used in Study 1. In a prior study, high-status actors activated larger and less dense networks than low-status actors (Smith, Menon, and Thompson 2012).

Figure 3.3: Proportion of Ties that are Organizationally Distant – Gain / Loss (Study 1)

Thus, it is possible that the individuals who are apt to ascend to executive positions in organizations are more likely to adopt a proactive, externally oriented stance toward situations of uncertainty than those who are less likely to be promoted to such roles. If so, then these selection factors could account for the negative results pertaining to the theories of threat-rigidity and the (conditionally) positive results for reactance theory. Study 2 addressed this limitation.

STUDY 2

Research Setting and Study Participants

The study population consisted of participants in the on-line subject pool of at an East Coast business school. Given the study's focus on network activation in organizations, I used a pre-screening survey to identify US-based employed individuals in establishments with at least 25 people. These individuals received an email invitation and an offer of \$5 to participate in the

study. The resulting sample included 129 subjects with the following characteristics: mean age – 33.3 years (standard deviation, 9.04); mean years of work experience – 11.4 years (standard deviation, 9.02); proportion female – .496; proportion White – .814; proportion Black / African American – .031; proportion Asian – .078; proportion Hispanic / Latino – .023; proportion born outside the US – .132; proportion now married – .643; proportion never married – .302; and proportion working in a small office (i.e., less than 500 employees) – .558. Relative to the sample from Study 1, this sample was younger, had fewer years of work experience, and worked in smaller establishments. These factors, combined with the fact that they participated in an on-line experiment, suggest that this group likely consisted of people from lower socioeconomic strata than the business executives who participated in Study 1.

Procedure

The experimental procedure was identical to that used in Study 1, except that the order of the manipulation and the name generators was reversed. I first asked participants to elaborate three kinds of networks: people within the organization with whom they worked closely, people within the organization with whom they did not work closely but still considered important contacts, and people outside the organization they considered important contacts. As in Study 1, response boxes appeared one at a time, with a limit of 10 boxes per question (i.e., subjects could list up to 30 contacts). I used the same manipulation as in Study 1. Following the manipulation, subjects could indicate with a “yes” or “no” response whether they would choose to discuss the situation with each of the contacts listed prior to the manipulation. I then asked them to list any additional people with whom they would discuss the situation. They could list up to seven contacts inside the organization and up to seven contacts outside the organization. Response boxes again appeared dynamically.

Manipulation Checks

I used the same manipulation checks (i.e., the same three composite measures) as in Study 1. The mean of the composite measure of perceived uncertainty was 9.71 (standard deviation of 3.32), with 57% of subjects perceiving the situation as more uncertain than certain. Thus, although the manipulation appeared to work in making people feel uncertain, subjects in Study 2 seemed to feel somewhat less uncertain than those in Study 1. Subjects in the agency condition perceived having significantly more influence over the situation than those in the constraint condition; the mean difference was 2.28 (t statistic=4.98; $p=.000$). Respondents in the gain condition perceived significantly more potential gain in the situation than those in the loss condition; the mean difference was 3.53 (t statistic=9.07; $p=.000$). Overall, participants' perceptions of the hypothetical situations were again consistent with those intended.

Variables and Estimation

The modified design of Study 2 yielded three response variables: (1) total ties activated, (2) ties activated from among the set of contacts initially elaborated, and (3) additional ties activated following the manipulation. Following the same estimation approach as in Study 1, I report below the results for (1) total ties activated. In all cases, comparable results were obtained using (2) ties activated from among the set of contacts initially elaborated. No significant differences across uncertainty conditions were detected when considering only (3) additional ties activated following the manipulation. I also tested the robustness of the findings to the inclusion of the same control variables as used in Study 1. In Study 2, I also had a measure of pre-existing network size – i.e., the number of contacts listed before the subject received the manipulation – which I used as a control variable. The results reported below were robust to the inclusion of these controls.

Results

Table 3.3 reports descriptive statistics and a correlation matrix. The number of subjects per cell varied based on response rates to the survey: 47% of respondents were assigned to the loss (rather than gain) condition, while 54% of respondents were assigned to the constrained (rather than agency) condition. Across all four conditions, subjects indicated that they would activate a mean of 5.19 contacts, 25% of which were organizationally distant. Compared to Study 1 and perhaps reflecting the difference in age and years of working experience between the two samples, a somewhat lower percentage (61%) of respondents reported having experienced a situation like the one described in the manipulation at least once in the past.

I first report the results pertaining to threat-rigidity theory (H1 and H2). The Poisson QML regression of ties activated on *Constrained* was not significant ($\chi^2(1)=1.00$, $p=0.318$). Similarly, the fractional logit regression of the proportion of organizationally distant ties on *Constrained* was not significant ($\chi^2(1)=0.67$, $p=.413$). As in Study 1, neither Hypothesis 1 nor Hypothesis 2 was supported.

I next report the results for hypotheses derived from reactance theory (H3 and H4). Because the Poisson QML regression of ties activated on *Constrained* was not significant, there was also no support for Hypothesis 3. Including *Constrained*, *Work Locus of Control*, and *Constrained x Work Locus of Control* in the model yielded significant results ($\chi^2(3)=10.84$; $p=0.013$). Neither main effect – *Constrained* ($\beta = 0.062$, $p=0.474$) or *Work Locus of Control* ($\beta = 0.001$, $p=0.874$) – was significant; however, the interaction term, *Constrained x Work Locus of Control*, was both positive and significant ($\beta = 0.027$, $p=0.027$). Figure 3.4 depicts the magnitude of this effect using a median split of the sample on the composite internal locus of control measure. Those in the lower half of the distribution activated 5.03 ties under conditions

of agency and 4.71 ties under conditions of constraint (i.e., 6% fewer ties under constraint than agency), while those in the upper half of the distribution activated 4.78 ties under conditions of agency and 5.95 ties under conditions of constraint (i.e., 24% more ties under constraint than agency). Thus, as in Study 1, Hypothesis 4 was supported.

Finally, I report results pertaining to the predictions of loss aversion (H5 and H6). The Poisson QML regression of ties activated on *Loss* was significant ($\chi^2(1)=4.55$, $p=0.033$), yielding a positive coefficient for *Loss* of 0.189. Figure 3.5 depicts the effect size: the mean of ties activated in the gain condition was 4.72, while the mean in the loss condition was 5.70 (i.e., 21% more ties under loss than gain). Thus, as in Study 1, there was support for Hypothesis 5.

The fractional logit regression of proportion of organizationally distant ties activated on *Loss* was not significant ($\chi^2(1)=2.42$, $p=0.120$) and resulted in a coefficient for *Loss* of 0.653. Although this effect was not significant, it is worth noting that the trend was in the opposite direction to that observed in Study 1 – i.e., 21% of ties activated in the gain condition were organizationally distant, but 30% of ties in the loss condition were distant. Thus, unlike in Study 2, there was no support for Hypothesis 6.

Table 3.3: Descriptive Statistics and Correlation Matrix – Study 2

	Mean	S.D.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
(1) Ties Activated	5.19	2.71	1.0														
(2) Loss	0.47	0.50	0.2	1.0													
(3) Constrained	0.54	0.50	0.1	0.1	1.0												
(4) Proportion Org. Distant	0.25	0.32	0.0	-0.1	-0.1	1.0											
(5) Age	33.32	9.04	-0.2	0.0	0.0	-0.0	1.0										
(6) Female	0.50	0.50	-0.0	-0.1	-0.1	0.2	-0.0	1.0									
(7) White	0.81	0.39	0.1	-0.0	0.1	0.0	0.1	0.2	1.0								
(8) Black / Af. Amer.	0.03	0.17	-0.1	0.0	-0.1	-0.0	-0.1	0.1	-0.4	1.0							
(9) Asian	0.08	0.27	0.0	-0.1	0.0	-0.0	-0.0	-0.2	-0.6	-0.1	1.0						
(10) Born – Ex US	0.13	0.34	0.0	0.2	-0.0	-0.1	-0.1	-0.3	-0.3	0.1	0.3	1.0					
(11) Now Married	0.64	0.48	-0.1	-0.1	-0.1	0.1	0.5	0.3	0.1	-0.1	-0.0	0.1	1.0				
(12) Never Married	0.30	0.46	0.2	0.1	0.1	-0.1	-0.6	-0.2	-0.1	0.1	0.1	-0.0	-0.9	1.0			
(13) Past Experience	0.61	0.49	-0.1	-0.0	-0.1	0.2	0.5	-0.0	0.0	-0.1	0.1	0.1	0.3	-0.4	1.0		
(14) Small Office	0.56	0.50	-0.0	-0.0	0.2	-0.1	0.0	-0.3	-0.1	0.1	0.1	0.0	-0.2	0.2	-0.3	1.0	
(15) Work Locus of Control	0.00	6.95	0.2	-0.0	0.1	-0.2	0.1	-0.2	-0.0	0.1	0.1	0.2	-0.1	0.1	0.0	0.2	1.0

N=129

Figure 3.4: Ties Activated – Agency / Constrained x Locus of Control (Study 2)

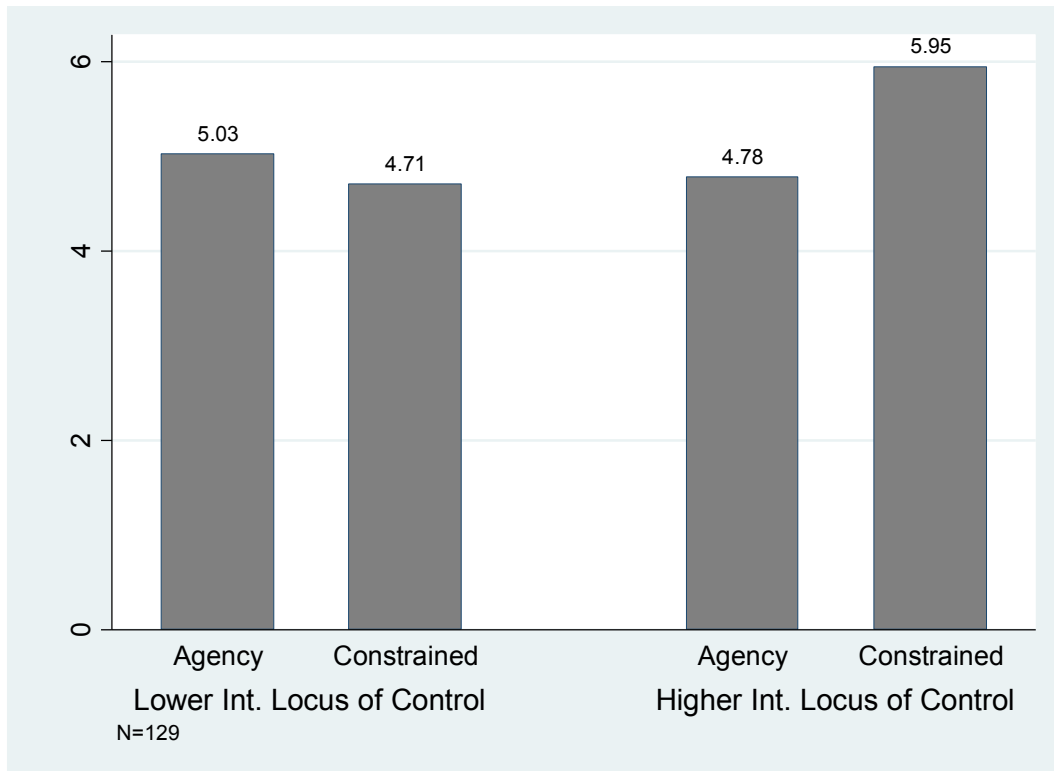
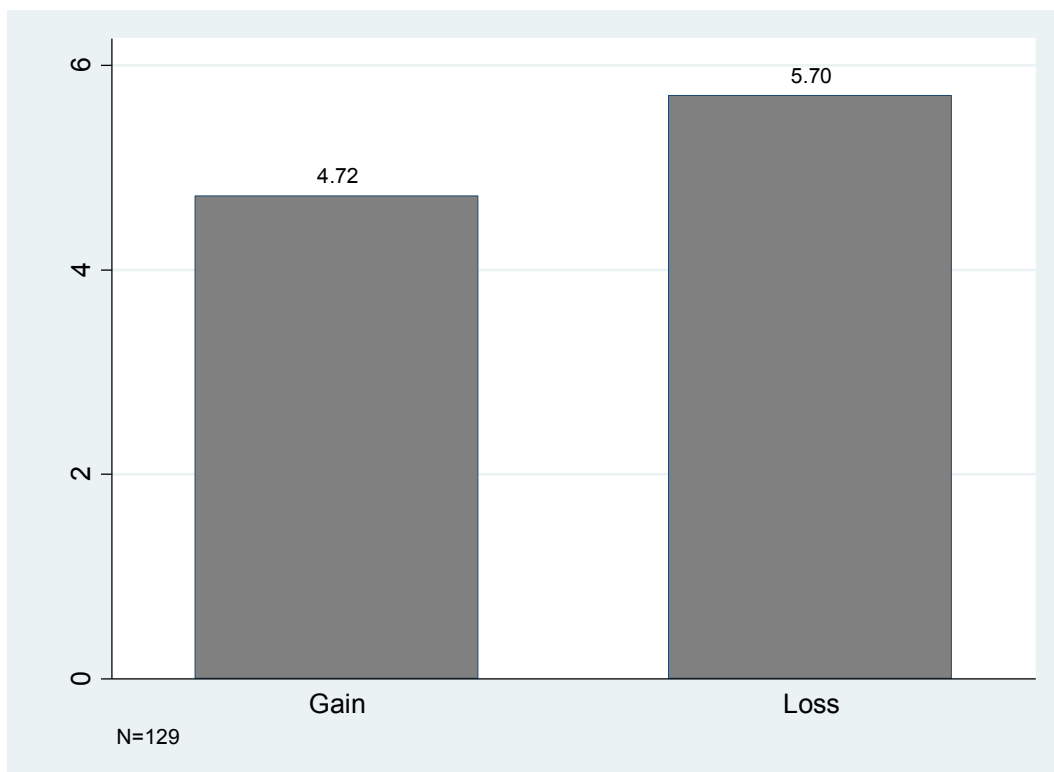


Figure 3.5: Ties Activated – Gain / Loss (Study 2)



Discussion

Study 2 replicated all but one of the findings of Study 1. There was no support for the hypotheses derived from threat-rigidity theory. There was conditional support for reactance theory in that subjects with a high internal locus of control activated more ties under conditions of constraint than when they had agency, while subjects with a low internal locus of control activated more ties when they had agency than when they felt constrained. One, but not both, of loss aversion's hypotheses was supported: conditions of loss led people to activate more ties. Differences in establishment size may help account for this discrepancy. In Study 1, all participants worked for an organization consisting of over 50,000 employees. By contrast, subjects in Study 2 worked in comparatively small establishments. Organizationally distant ties may prove less valuable in small establishments, which tend to be less differentiated (Blau 1970). As a result, in small establishments, contacts in different subunits are less likely to have access to valuable, non-redundant information (Friedkin 1982). Thus, in these settings, the costs of activating cross-unit ties – e.g., having to overcome interpretive barriers (Dougherty 1992) – may exceed the benefits.

GENERAL DISCUSSION AND CONCLUSION

This article has sought to clarify the cognitive mechanisms through which situational uncertainty influences social capital activation in organizations. In particular, the study clarifies the relative contributions of threat-rigidity, reactance, and loss aversion in shaping affiliation choices under uncertainty. The conceptual arguments are based on the disentangling of threat / opportunity into two distinct dimensions: constraint / agency and loss / gain (George et al. 2006). That is, uncertain situations foster threat when they entail the potential loss of tangible resources or limited freedom to maneuver. By contrast, uncertain situations create a sense of opportunity

when they involve the chance to gain tangible resources or give people freedom to operate. Threat-rigidity theory (Staw, Sandelands, and Dutton 1981) implies that uncertain situations involving constraint (rather than agency) will lead people to activate fewer ties and a lower proportion of organizationally distant ties. Reactance theory (Brehm 1966; Wicklund 1974) instead implies that people will activate more ties under constraint (relative to agency) and that this effect will be amplified for people with an internal, rather than external, locus of control (Rotter 1966). Loss aversion (Kahneman and Tversky 1979) indicates that people will activate more ties and a greater proportion of organizationally distant ties when facing uncertain situations of loss relative to ones of gain. Two experimental studies were conducted studies based on an established protocol (Smith, Menon, and Thompson 2012) and involving 158 executives in a health company (Study 1) and 129 on-line subject pool participants working in establishments with at least 25 employees (Study 2). The results show: (1) no support for the predictions of threat-rigidity; (2) conditional support for the expectations of reactance theory: the tendency to activate more ties under conditions of constraint (rather than agency) was moderated by an individual's internal locus of control; and (3) consistent support for one of loss aversion's propositions (i.e., more ties were activated in loss than in gain) and partial support for the other (i.e., in Study 1, a greater proportion of organizationally distant ties were activated in loss than in gain).

Findings from this study make four primary contributions. First, they deepen our understanding of the interrelationships between cognition and social structure (DiMaggio 1997; Kilduff and Krackhardt 2008; Lizardo 2006; Srivastava and Banaji 2011; Vaisey and Lizardo 2010) by clarifying the role of uncertainty-related schemata in steering network action. The findings contradict a core premise of threat-rigidity theory (Staw, Sandelands, and Dutton 1981):

that people respond to threatening situations by curtailing the search for information and turning inwards. Instead, organizational actors appear to respond to the threat of losing of tangible resources by engaging in more, rather than less, intensive search – that is, by activating a larger number of ties. In large organizational settings such as that of Study 1, they also appear to search outwards, rather than inwards, by activating a greater proportion of organizationally distant ties. In a similar vein, the threat imposed by situational constraints seems to lead people with a high internal locus of control to search more, rather than less intensively, for resources accessible through contacts.

Second, although it was not explicitly designed to do so, the study also informs our understanding of the relative roles of automatic and deliberative cognition in managerial responses to uncertain threats and opportunities (Dutton 1993; Julian and Ofori-Dankwa 2008). Prior research has established that activated goals, such as those triggered by uncertain situations, can lead people to recall different subsets of social relations (Fitzsimons and Shah 2008). Yet the present study raises questions about the causal role of cognitive accessibility in the choice to initiate interaction with, rather than just recall, these contacts. In Study 2, subjects selected contacts from a list they had recalled before they knew the situation they were in. That is, their activation choices were conditioned on the recall of contacts. Yet, with one exception, Study 2 replicated the findings of Study 1, in which subjects listed contacts after learning about the situation. Moreover, in Study 2, there were no differences across uncertainty conditions in the size or breadth of additional contacts listed following the manipulation. These results are consistent with the notion that – at least in deciding which networks to activate in response to uncertain events – organizational actors appear to be guided more by deliberative cognition than by the less conscious, or automatic, recall of contacts. Further experimental work is needed to

explicitly test this proposition and identify the conditions under which network activation is instead characterized by post-conscious or goal-dependent automaticity (Bargh 1989).

Next, this work also has implications for research on the rhetoric of organizational restructuring (Bartunek 1984; Erkama and Vaara 2010; Hirsch and De Soucey 2006). For example, Hirsch and De Soucey (2006: 178) characterize societal trends in restructuring rhetoric as follows: “Nonoffensive language (terms such as adjustment and flexibility) is regularly used to mask, reframe, and sugarcoat economic slumps as possessing positive social outcomes.” Findings from this study point to a potential cost of this use of nonoffensive language and sugar coating. If such rhetoric dampens perceived losses from restructuring, it may lead workers to activate fewer network ties and therefore obtain fewer social resources to weather the storm. Thus, attempts by managers to frame organizational change in a less threatening light – for example, by shielding employees from the potentially harmful personal career consequences of restructuring – can have unintended adverse consequences (Merton 1936).

Finally, this study also contributes to the growing body of research that examines the divergence between formal and informal organization during times of change (Gulati and Puranam 2009; Hannan, Polos, and Carroll 2003a; Hannan, Polos, and Carroll 2003b; Nickerson and Zenger 2002). These studies have importantly documented the tendency for changes in the informal structure to lag behind those in the formal structure. The present study identifies a specific mechanism – social capital activation in response to uncertain situations – that can give rise to this divergence. In the large organizational setting of Study 1, uncertainty associated with loss led people to activate a greater proportion of ties outside their formal subunit. That is, whereas prior research has shown that interpersonal networks in workplace settings tend to hew to the formal organizational structure (Han 1996; Hinds and Kiesler 1995; Ibarra 1992b), this

study suggests – at least in large, differentiated organizations – the formal structure imposes a relatively weak constraint on interpersonal contact under conditions of uncertain loss. In these settings, network activation may contribute to the persistence of informal structure, as manifested in interpersonal ties that do not correspond to departmental lines, during times of formal structural change.

These contributions notwithstanding, the study has certain limitations, which suggest avenues for future research. First, although Study 2 controlled for total network size, it did not account for other features of pre-existing network structure, such as the extent to which a subject's network is rich in structural holes (Burt 1992), that could plausibly influence network activation choices (Gargiulo and Benassi 2000; Hurlbert, Haines, and Beggs 2000; Uehara 1990). Future research could replicate the design of Study 2 but include an alter-by-alter matrix to derive other measures of subjects' pre-existing networks. Second, this study design did not allow one to distinguish whether the activation choices people made were functional (e.g., seeking career advice from trusted mentors) or dysfunctional (e.g., engaging in idle gossip) from the perspective of the individual or the organization as a whole. Future designs should attempt to measure the outcomes of activation choices. Third, prior research has highlighted the role of the help provider in determining the resources that accrue to the help seeker (Smith 2005). This insight raises intriguing questions about how different forms of uncertainty influence a potential help provider's propensity to activate her network on behalf of a help seeker (e.g., the level and quality of resources provided to help seekers by help providers under gain versus loss). Finally, the literature on strategic issue identification has importantly noted that uncertain events often do not fall neatly into buckets of threat or opportunity; rather, issues are often ambiguous – i.e., they have elements of both gain and loss (Cacioppo and Berntson 1994; Plambeck and Weber 2009;

Plambeck and Weber 2010). Moreover, interpretations of threats and opportunities can vary across cultural settings (Barr and Glynn 2004). Thus an important next step is in understanding how people use their networks when facing ambiguous forms of uncertainty and when operating in different cultural domains.

In sum, the study uncovers how uncertain situations can fuel network dynamics through the activation of social capital. It reveals the cognitive mechanisms that steer actors' choices about network activation and that can influence the nature and quality of resources they obtain during critical organizational junctures.

CHAPTER 4: SHADOWING NETWORKS – A FIELD EXPERIMENT TO ASSESS THE EFFECTS OF CROSS-TRAINING ON WORKPLACE NETWORKS

INTRODUCTION

There is by now a wealth of evidence linking the nature and quality of interpersonal networks within organizations to various indicators of individual attainment – for example, performance evaluations and rewards (Burt 1992), career mobility (Podolny and Baron 1997), the generation of valued new ideas (Burt 2004), the ability to close customer deals (Mizruchi and Stearns 2001), and relative power and influence (Brass 1984). Yet despite the importance of networks for individual success, remarkably little is known about what organizational practices, if any, actually help employees build interpersonal connections.

Recent years have seen the adoption by firms of a set of practices that should, in principle, spark the formation of internal network connections. In particular, a staggering proportion of firms have restructured their operations according to the principles of “high performance work” practices (Kalleberg, Marsden, Reynolds, and Knoke 2006; Osterman 2000). Central among these practices are cross-training programs, which are thought to expand and extend employees’ workplace networks. For example, Kalev’s (2009) study of the life histories of over 800 organizations reports that, after firms adopted cross-training and other programs designed to support cross-functional collaboration, ascriptive inequality declined. Kalev (2009: 1595) argues that these programs “create new opportunities for peerlike collaborative relations between workers from more- and less-valued jobs [and] can increase visibility and reduce the stereotyping of women and minorities.” Similarly, in a study of the career consequences of job rotation – a form of cross-training – in a pharmaceutical firm, participating employees reported

experiencing the benefit of “increased networks of contacts” (Campion, Cheraskin, and Stevens 1994: 1537). Yet the research designs of these studies did not permit direct observation of changes in interpersonal networks – a core mechanism through which cross-training programs are presumed to influence attainment and inequality.

Indeed, we have heretofore lacked compelling evidence of the causal effects of new workplace practices, such as cross-training, on interpersonal networks. For example, a recent methodological review of 112 peer-reviewed articles and dissertations on the effects of employee development programs, such as cross-training, on networks uncovered only seven studies that even attempted to establish a causal link (Van de Valk and Conostas 2011). The authors assessed these studies using well-established criteria for causal identification (Shadish and Cook 2009; Shadish, Cook, and Campbell 2002): temporal ordering (participation in the program should precede network change), observable difference (programs designed to change networks should have a measurable impact), counterfactual case (participants should have different outcomes than a comparison group that did not participate), and internal validity (alternative explanations should be implausible). None met these criteria, leading the authors to conclude that “little empirical evidence exists to support a causal assertion that participation in an [employee development program] enhances [social capital]” (Van de Valk and Conostas 2011: 86).

The present study has four primary objectives. First, to the extent that participation in cross-training programs alters interpersonal networks, the study attempts to uncover the mechanisms through which these changes occur. I report qualitative evidence from 40 semi-structured interviews of past program participants. Second, it aims to be the first to provide a direct test of the theorized causal relationship between participation in an employee development program, such as cross-training, and changes in interpersonal networks. I report the results of a

longitudinal field experiment involving 91 participants in a cross-training program in a software development laboratory in China and a matched control sample of 85 non-participants. Third, the study aims to clarify how individual differences can influence the effectiveness of cross-training. I examine the role of a cognitive orientation – the implicit collaborative self-concept (Srivastava and Banaji 2011) – that has been associated with collaborative networks in organizations on the formation of ties that bridge internal organizational boundaries (e.g., departments). Finally, I seek to contribute to research on ascriptive inequality in the workplace by assessing the differential effects of cross-training on the workplace networks of males and females. The analyses reported below allow for such a comparison, while controlling for all time-invariant, unobserved individual differences among program participants.

THEORY

High Performance Work and Cross-Training Programs

Research on employment relations has documented the steady adoption by US firms of internal labor market innovations such as self-directed work teams, quality circles, and job rotation, and training programs (Black, Lynch, and Krivelyova 2004; Kalleberg, Marsden, Reynolds, and Knoke 2006; Osterman 1994). These innovations have been loosely termed “high performance work” practices, though the evidence about their link to organizational performance has been mixed (Cappelli and Neumark 2001; Kalleberg and Moody 1994). Among these practices, some are designed to increase the permeability of job boundaries and increase the exposure of employees to colleagues in other parts of the organization (Evans and Davis 2005). This investigation focuses on one such practice, cross-training – defined as “multiskilling programs that provide workers with knowledge of and experience in different jobs” Kalev (2009: 1600) –

which has diffused broadly across firms. By 2002, over 80% of the firm's in Kalev's sample had adopted cross-training.

Cross-Training and Workplace Networks

In developing the argument about how cross-training can be expected to alter the workplace networks of participants, I draw the distinction between new tie formation and the activation of previously formed ties (Hurlbert, Haines, and Beggs 2000). That is, just because a tie has formed does not mean it will remain active indefinitely; rather, many pre-existing ties become latent and remain so until one person activates the tie – that is, initiates contact with the other. Cross-training can be expected to increase the stock of workplace networks by promoting new tie formation and the flow of resources through networks by stimulating tie activation. With respect to tie formation, prior research has shown that the formal organizational structure importantly constrains the opportunity structure for contact and thereby shapes internal network patterns (Han 1996; Hinds and Kiesler 1995; Ibarra 1992b). Stated in more familiar terms, we know that “social associations depend on opportunities for social contact” (Blau 1977: 281). By bringing people into contact with colleagues in different organizational subunits, cross-training will tend to expand the opportunity structure for interaction and thereby support new tie formation. Moreover, when cross-training occurs in the context of project teams or work groups, these collective units will serve as foci that further promote tie formation (Feld 1981). With respect to network activation, ties that span formal organizational boundaries are especially likely to remain latent because of the myriad barriers to cross-boundary collaboration – for example, the cognitive, or interpretive, differences that drive a wedge between formal subunits (Dougherty 1992). Cross-training promotes the formation of shared mental models about group interaction and facilitates inter-group coordination (Marks, Sabella, Burke, and Zaccaro 2002). Thus,

participants in cross-training will be more likely to activate latent ties, particularly those that bridge formal organizational boundaries. Taken together, these arguments lead the baseline hypotheses about cross-training and workplace networks:

H1: Relative to non-participants, participants in cross-training will form and activate a larger number of workplace ties.

H2: Relative to non-participants, participants in cross-training will form and activate a greater proportion of bridging ties.

Implicit Collaborative Self-Concept and Bridging Ties

In recent years, network researchers have identified a range of individual-level factors that are associated with the tendency to form particular kinds of interpersonal connections. Examples of these attributes include: self-monitoring (Mehra, Kilduff, and Brass 2001; Oh and Kilduff 2008), the propensity to connect with others (Totterdell, Holman, and Hukin 2008), and network entrepreneur personality (Burt, Jannotta, and Mahoney 1998).

In this vein, a recent study has examined the link between how people view themselves as collaborative or independent actors and their propensity to form bridging ties in organizational settings (Srivastava and Banaji 2011). The authors argue that in organizations with strong collaborative norms, the available toolkit of symbols, stories, rituals, and worldviews that people use to justify and make sense of their actions can become constrained (Swidler 1986). As a result, in deliberative – or “discursive” – cognition, they will tend to frame interactions in terms that are consistent with prescribed norms of collaboration even when an objective observer might

think otherwise. By contrast, less conscious self-views – or “practical” cognition – will be less susceptible to distortion (Vaisey 2009). The authors develop a technique (described in greater detail below) to measure the latter: the implicit collaborative self-concept. They then demonstrate in a field setting that this measure is positively associated with ties that bridge formal organizational boundaries (e.g., departments).

Extending this line of work to the domain of cross-training programs, I argue that – in organizations with strong collaborative norms – participants with a more collaborative, rather than independent, implicit self-concept will be more likely to form and activate ties that bridge formal organizational boundaries. That is, I expect:

H3: The tendency to form and activate a greater proportion of bridging ties will be amplified for individuals with a more collaborative, rather than independent, implicit self-concept.

Sex Differences in the Effects of Cross-Training on Workplace Networks

A robust literature has examined sex differences in workplace networks. For example, males and females have been shown to build segregated networks in organizations (Brass 1985); vary in their propensity to form same-sex connections for instrumental versus expressive purposes (Ibarra 1992a; Ibarra 1997); differ in their level of access to high status contacts (McDonald in press; McGuire 2000); and have networks that vary in occupational and socioeconomic diversity (Campbell 1988).

On one hand, this literature might lead one to expect that, relative to females, males will derive greater network-related benefit from cross-training, which often entails movement to

advantaged organizational positions (Ibarra 1992a; Miller 1986; Olson and Miller 1983). For example, a cross-country study of females in elite positions in powerful institutions finds that “even women who have attained positions at the pinnacle of powerful national organizations remain less well-connected in informal elite networks than male colleagues....While formally women are insiders among top elites, informally they remain at best on the periphery and perhaps even as outsiders” (Moore 1988: 576). Similarly, McGuire (2002: 316) concludes from an analysis of workplace networks in a large organization: “Even when Black and white women had jobs in which they controlled resources and had network members who controlled resources, they received less informal help than white men did.”

Yet cross-training typically involves a temporary move to a new organizational position and affords only transient access to power and resources. As a result, cross-training is unlikely to provide the conditions that would enable males to convert an advantaged structural position into sustained network advantage. Instead, for three reasons, I argue that females will benefit more from cross-training than will their male counterparts. First, jobs in organizations tend to be sex-segregated, with females occupying structurally disadvantaged positions (for a review, see Reskin, McBrier, and Kmec [1999]). By moving female employees from structurally disadvantaged positions to advantaged ones, cross-training can provide females with better access to network resources. Indeed, sex differences in networks are known to become less pronounced after controlling for structural positions (Moore 1990). Along the same lines, McGuire’s (2000: 519) study of employees in a large financial services company concludes: “Structural exclusion from high-ranking and resourceful positions, not a lack of networking knowledge or skills, prevented White women and people of color from forming ties to powerful network members.” A second, related argument focuses on the increased visibility that female

employees gain when cross-training moves them out of structurally disadvantaged positions. Improved visibility in turn reduces the effects of stereotyping and promotes network expansion (Kalev 2009). Finally, Burt's (1998) theory of borrowed social capital suggests that more peripheral actors in organizations often lack legitimacy and therefore stand to derive greater benefit when they "borrow" social capital from a high-status, well-connected sponsor. To the extent that cross-training involves assignment to such a sponsor, this theory predicts that the experience will provide lead to greater benefit for female employees than for their male counterparts. Taken together, these arguments suggest:

H4: Relative to male participants, female participants in cross-training will form and activate a larger number of workplace ties.

EMPIRICAL SETTING AND CROSS-TRAINING PROGRAM DESCRIPTION

I tested these hypotheses in the context of a rapidly growing software development laboratory, which was located in the People's Republic of China but part of a US-based global technology products and services firm. The laboratory employed several thousand people and was organized into departments, corresponding to the firm's global software brands and to various cross-brand programs. Software developed in this laboratory was distributed and used throughout the world. Although the majority of employees were born and educated in China, they were generally proficient in English and, like all employees at this firm, conducted business meetings in English. Similar to other technology companies, this firm had a two-track career path for technical employees: they could rise through the organization on the technical track, as individual contributors, or transition at some point to the managerial track. Finally, the firm as a

whole had an explicit strategy to integrate products and services across business units and geographies. As a result, it adopted and reinforced strong collaborative norms throughout the enterprise. That is, it had the kind of organizational culture in which normative pressures are thought to create a disparity between how people view themselves as collaborative actors in deliberative cognition versus less conscious, or implicit, cognition (Srivastava and Banaji 2011).

Over the years, the firm had shifted an increasing share of its software development activity from the United States to less expensive locations such as India and China. As a result, the software development laboratory in China experienced rapid growth. Senior management in China recognized that competent managerial talent represented an important constraint on the lab's ability to grow. In the past, the firm had relied on global transfers and rotations as a means to developing the managerial skills of technical employees. The premise behind these programs was that exposure to different parts of the business and new managerial styles would help a technical employees learn general management skills and build a broader professional network. Given rapid growth, the software development lab's need for managerial talent outstripped the capacity of the existing global transfer and rotation programs, which were also costly to implement. The head of the software development lab therefore decided to experiment with alternatives to global transfers and rotations such as cross-training.

The shadowing program analyzed in this study was one such experiment. It was targeted to well-performing employees in both the technical and managerial tracks. Individuals were nominated for the program by their managers. A program manager in human resources made final selection decisions and then matched participants to senior leaders based on expressed learning needs, preferences, and expected future career path (e.g., technical or managerial track). Matches were made across departmental lines – that is, shadows worked in a different

department than the senior leaders to whom they were assigned – so that program participants could gain exposure to different customer requirements, work processes, and internal stakeholders. There were sixteen such departments, each corresponding to a direct report of the laboratory head. The exposure to different departments was thought to not only enhance participants' career development but also promote cross-department collaboration and knowledge exchange.

The mechanics of shadowing worked as follows. Those selected into the program were assigned to 'shadow' a more senior leader for a finite period – typically the equivalent of twelve business days spread out over two to three months. I henceforth refer to program participants as shadows and senior leaders to whom they were assigned as the executive host. Shadows and their executive host had an initial kick off meeting to discuss goals and objectives. The executive host would then grant the shadow access to his or her electronic calendar. Shadows could attend any meeting on the calendar, except for sensitive career discussions between the executive host and a direct report – for example, a performance review. In some cases, executive hosts would also assign shadows a discrete project to complete during the assignment. Although the list of shadows was not formally announced, people generally knew who was shadowing whom at any given point in time. For example, executive hosts would typically introduce their shadows at the start of a meeting. Similarly, colleagues in a shadow's home department would know that the person would be less accessible and have less time for departmental projects. Upon conclusion of the program, shadows would return to their original job role.

I evaluated the shadowing program in two phases. The first phase involved qualitative research with past program participants. Insights from these semi-structured interviews informed the design of a field experiment that assessed the program's effects on workplace networks.

PHASE 1: QUALITATIVE EVIDENCE

The qualitative evidence consisted of 40 semi-structured interviews, 30 of which were conducted in person and 10 over the phone. Appendix 4.A provides the interview schedule. Because this shadowing program had only recently been implemented, there were only 31 alumni at the time I started this study. I invited all of these alumni shadows to participate in the interviews; 22 (71% response rate) agreed to do so. In addition, I invited all 11 executive hosts who had taken on a shadow in the past. All agreed to do so. I also interviewed seven program administrators in human resources. Interviews with executive hosts lasted 30 minutes, while those with shadows and program administrators lasted 45 to 60 minutes. Interviews were tape recorded and transcribed. In all cases, interviewees were told that their individual responses would remain confidential and that no identifying information would be revealed in study reports. Because most interviewees were not native English speakers, I edited some of the quotations reported below for grammar and syntax.

I coded and analyzed the qualitative data using a software tool – Atlas.ti. I focused on the factors that seemed to affect the size, quality, or composition of participants' workplace networks. I started by developing detailed codes, such as "Knowledge about the Skills of Colleagues in Related Units." I later grouped these specific codes into code families or categories, such as "Cross-Boundary Knowledge Acquisition." Next I developed a framework, described in greater detail below, of the interrelationships among these categories. The interviews did not surface any systematic sex differences in the experiences of participants. Similarly, it was not possible to detect in interviews potential differences among participants in the implicit collaborative self-concept. The findings reported below instead highlight the

mechanisms that seemed to produce changes in interpersonal networks following participation in the program.

The movement of participants to different organizational subunits – though temporary – enabled the transfer of knowledge across internal boundaries. For example, participants gained greater knowledge of adjacent subunits. As one past shadow in the managerial track reported, “When we work on software development, we need to use automation tools to improve efficiency and quality. Before my shadowing experience, I used homemade tools for this automation. It took a long time to develop and maintain these tools. After the [shadowing] program, I learned [the host executive’s] team has better tools. So now I just use tools developed by [his] team....Now I’m starting to share what I’m doing in my team with [his] team.”

Similarly, the program exposed participants to the skills of colleagues in related units. As a host executive commented, “[The shadows assigned to me] learned about the people in my team, especially the technical leaders. So that would make it easier to collaborate with them in the future.” As a result of these knowledge flows, participants and colleagues in the units to which they were assigned often surfaced new opportunities for cross-unit collaboration.

In addition to knowledge flows, the program also expanded the opportunity structure for cross-unit contact. Department meetings provided an important vehicle for these interactions. As a shadow in the technical track reported, “I had heard the name of [the direct reports of my host executive] before but had not had face-to-face meetings with them. In department meetings, I got to sit in front of these people. We got to discuss and debate different topics. We got to know each other’s thinking styles. We had lunch together. That made us more familiar with each other.” Project teams to which participants were assigned also served to focus and structure interactions (Feld 1981). A shadow in the managerial track stated, “[In the shadowing assignment] I led some

projects for [the host executive]. For example, I helped [my host executive] organize his strategy meetings....I had to think about how to organize it. I went to [the host executive], his direct reports, and other senior people to get their experience. I think it's essential for the shadow to take on something concrete. It could be big or small. That practice can really help."

By enabling the flow of knowledge across internal boundaries and creating opportunities for cross-unit contact, the shadowing program served to expand participants' latent network. As one shadow in the managerial track reported, "I build up indirect ties from the experience. The person I was shadowing would introduce me. I would speak up in meetings....I got to know more people, and they got to know me better. Next time, they are able to ask me for help. And if I know that someone knows something, I will feel comfortable asking for help."

Beyond helping participants expand their latent workplace network, the program also created conditions conducive to the conversion of latent ties to active ones. First, it made participants more attractive as network partners. Although interviews varied in their beliefs about the program's effects on the social standing of participants, a majority thought that selection into the program boosted an individual's status. As a shadow in the technical track reported, "[Being selected into the program] says that your manager cares about your career. He wants to increase your exposure. It's treated as a good sign. You're considered a high potential person. You're considered a technical resource for the future. It makes you a more desirable person for others to know." Moreover, the assignment to a senior manager often – though not always – served as a visible endorsement of the shadow. A shadow in the managerial track commented, "Usually [my host executive] just introduced me at the beginning of a meeting. She would say, 'He's my shadow.' When her staff found out I was her shadow, they treated me better and gave me more respect....It continued even after the program stopped. They didn't know why I was [my host

executive's] shadow. Maybe [she] chose me or maybe I know her very well. So they decided to treat me well."

Finally, the exposure to more senior managers allowed participants to develop self-confidence and reduce the social distance across hierarchical levels. This feature of the program proved especially useful in the Chinese cultural context. As a host executive remarked, "There's a subtle thing about networking. In [the Chinese] culture, the hierarchy of the organization is significant. By increasing their comfort level with senior people, the shadowing program brings the upper levels within reach. This may be less of an issue in the US because the boss isn't on a pedestal in the same way as here." In addition, the program helped participants reduce social distance by understanding and acquiring the norms governing interactions in the senior ranks. For example, a host executive commented, "[Shadows] learn how we interact at the senior levels. One common example is that junior people, when they go to a meeting, tend to communicate in a way that makes others think they can't think out of the box. They'll quickly say, 'Oh, I don't think it can be done.' That's not how executives communicate. My style is to say, 'Let's think about how to break the logjam.' Understanding these nuances of communication is especially useful for young people here in the lab." The reduction of social distance, combined with the status boost provided by the program, allowed certain participants to more readily convert latent ties to active ties. A host executive reported, "With all of my prior shadows, especially those who have good potential, I keep a continuous connection with them. I share some weekend time with them. I keep them in the distribution list." Figure 4.1 summarizes how the program helped certain participants expand their latent network and later activate these ties. Table 4.1 provides additional representative quotes for each element of the framework in Figure 4.1.

PHASE 2: FIELD EXPERIMENT

After completing the qualitative interviews, I worked with the human resources program administrators to design a field experiment involving the next batch of program participants. The program was expanded to include 102 new participants and 51 senior leaders (including the 11 who previously participated). It was implemented in two three-month phases, with approximately half of the participants in each phase.

In addition to this group of participants who received the treatment of the shadowing program, I worked with human resources to identify a control group of non-participants. The firm's corporate human resource policies prohibited the sharing of employee records with external researchers. It was therefore not possible to employ common matching techniques to construct the control group (Rubin 2006). Instead, I asked the program administrator to implement the following procedure. For each program participant, she identified two people who: (1) were at the same salary band; (2) had the same performance rating (on a 1-5 scale) in the prior year; (3) had the same tenure within the organization; (4) worked in the same office; and (5) had not previously participated in the shadowing program. When, as in most cases, more than two people met these criteria, she randomly selected two from the eligible list. In some cases, there was only one person who matched these criteria. In total, 189 people were identified through this procedure.

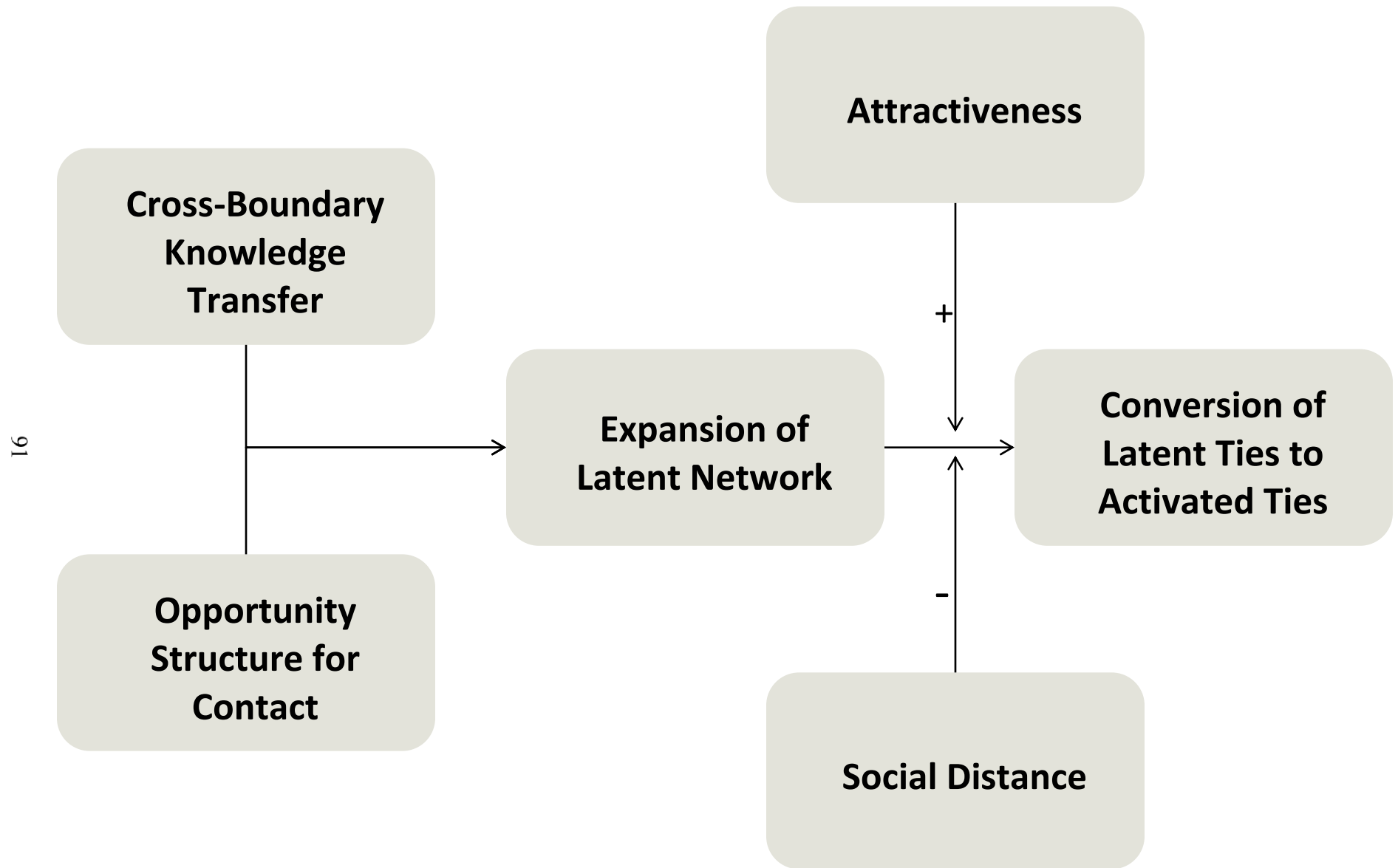
Figure 4.1: Network Change Following Cross-Training Program

Table 4.1: Qualitative Evidence – Network Change Following Program Participation

Category	Mechanism	Representative Quotes
Cross-Boundary Knowledge Transfer	Knowledge about Work Activity of Related Units	<p>“Through this program, I hoped to find some connections in our work – some mutual benefit or a common path. For example, for a project [the host executive] is working on, I might be able to help give resources from my own team.” – Shadow, Technical Track</p> <p>“By observing the daily activity of a higher-level leader (who is usually no more than 2-3 levels up), [shadows] get a chance to see how a different portion of the business runs. Because they usually come from a related area and are not so far removed from the leader, they can learn from what they see. They wouldn’t be able to shadow the CEO or even [the head of the lab] and get the same value from it.” – Host Executive</p> <p>“I think the best thing of this program is that it broadened my view and let me know the big picture of the kind of work I’m doing. I do a small piece of the work. Through this program, I see the full picture.” – Shadow, Technical Track</p>
	Knowledge about Skills of Colleagues in Related Units	<p>“At a technical level, I know more people. I have an awareness of what they know. But they are not concrete relationships because I didn’t have the opportunity to have personal talk or social talk with them.” – Shadow, Technical Track</p> <p>“Because my team learned what the shadow was doing and the shadow learned what my people are doing, their future relationship was made smoother.” – Host Executive</p> <p>“One of my shadows was at a meeting where we were discussing a problem. He spoke up to say that his unit had had a very similar problem. We asked him to share with us how they addressed it. After that meeting, people on my team knew they could call him for help with that kind of problem in the future.” – Host Executive</p> <p>“Now I know mission and resources of people [within the department of the senior leader to whom I was assigned]. That has given me some ideas about resource borrowing and rotation between our departments....I don’t need to go [the senior leader] to make this happen. I can go directly to his team.” – Shadow, Managerial Track</p>

Table 4.1: Qualitative Evidence – Network Change Following Program Participation (continued)

Category	Mechanism	Representative Quotes
Opportunity Structure for Interaction	Meetings	<p>“I came into contact with many new people. The organization in [the software lab] is like a tree. I normally work in just my branch – [name of department]. It was very rare for me to have a chance to talk to other senior managers in other branches. During that shadowing experience, I got an opportunity to talk to many of them.” – Shadow, Managerial Track</p> <p>“[My host executive] invited me to all of his manager meetings. He had KPI [key performance indicator] review meetings and special topic meetings. I attended about one meeting per week, 2 to 3 hours per meeting. In the first meeting, Jack introduced me to everyone. He introduced his managers to me. He told everyone the objective the shadowing assignment. He gave me an opportunity to introduce myself and my business to everyone.” – Shadow, Managerial Track</p> <p>“When I was doing the shadowing assignment, I was lucky that there was a [vice president] from the US visiting at that time. [My host executive] was responsible for handling the visit, and she got me involved in meetings with the VP. So I got to know the VP and the group of people who came with the VP on the visit.” – Shadow, Managerial Track</p> <p>“[My host executive] invited me to participate in strategy meetings for [the software development lab]. I got to meet all of [the head of the lab’s] direct reports. And I met some external people from our partner companies and sales people outside of [the lab].” – Shadow, Managerial Track</p>
	Project Assignments	<p>“Before the shadowing program, I just worked with people based on my own work - people who were directly involved in my projects. Otherwise, the only other people I knew were ones I got to know through [company’s] online communities. During the shadowing program, though, [the senior leader to whom I was assigned] had me participate in many projects. So I got to know many more people that way.” – Shadow, Technical Track</p> <p>“My main project was drafting a sales and development strategy for the next year. That was a very good opportunity for me to learn about the priorities for different brands and how we implement development activities to achieve group goals. I reviewed the slides with each the executive of each brand. That process gave me a very good visibility with these people.” – Shadow, Managerial Track</p>

Table 4.1: Qualitative Evidence – Network Change Following Program Participation (continued)

Outcome	Representative Quotes
<p>94 Expansion of Latent Network</p>	<p>“If I were to estimate the size of the increase in their network from the shadowing experience, I’d say it’s maybe a 10-20% increase. That’s because matches are usually made for job-related reasons: they pick me to shadow because they think it will be helpful for their job.” – Host Executive</p> <p>“Normally people generate relationships with people they work with....The shadow program offers a platform for new relationships to form – for example, a senior person gets paired up with an up and coming person.” – Host Executive</p> <p>“Before the assignment, I only knew the three executives in areas that were directly related to my work. Since then, I have gotten to know 9 or 10 executives. Among non-executives, the expansion was not quite as significant.” – Shadow, Managerial Track</p> <p>“I’d say there was an increase in my network, but not a big increase. Perhaps 5%. Through the shadowing program, I got to know more people in the department [of my host executive].” – Shadow, Technical Track</p> <p>“[My host executive’s department] is a large department. During the shadowing program, I got to know about 15 new people in this group.” – Shadow, Managerial Track</p> <p>“Because of the program, I have more expertise awareness, but I didn’t see much change in my interactions with people afterward. There is a change in awareness but not in actual contact with people.” – Shadow, Technical Track</p> <p>“I was exposed to something like 40-50 new people through the program. Maybe 10 of them became part of my network. Normally they were in a different business unit. If they were in the same business unit, I would have known them already. Normally, these were people more senior than me.” – Shadow, Technical Track</p>

Table 4.1: Qualitative Evidence – Network Change Following Program Participation (continued)

Category	Mechanism	Representative Quotes
Attractiveness	Status	<p>“You are viewed as being as a top prospect, like in baseball. Someone in the minor leagues who could get called up to the major leagues. Some people would view shadows from that perspective. They must be among the elite.” – Shadow, Managerial Track</p> <p>“I felt I got some extra respect [during the assignment]. It meant that the company recognized me and wants to develop me. But things went back to normal [after the program ended].” – Shadow, Managerial Track</p> <p>“If someone found out that I was selected [for the shadowing program], they would probably think that I am a high potential person. That respect lasts even after the experience ends. I think people generally know who has been in the program, even after their assignment ends.” – Shadow, Managerial Track</p> <p>“There are many programs in [the software lab] to develop talent. Shadowing is just one of them. I think it was helpful for me. But I also joined the mentoring program and other ones.... I think [the shadowing program] is associated with high potentials, but it is not very special. It’s a normal program.” – Shadow, Managerial Track</p>
	Visible Endorsement	<p>“The first role of [my host executive] was in introducing me to his guys. He provided the channel. He also encouraged his employees to share information with me without any hesitation.” – Shadow, Technical Track</p> <p>“I think [my host executive’s] introduction helped send a signal about me. When I followed up with people, I got responses very fast because it was known that I was working with [the senior leader]. Even when he introduced me by email, they’d respond quickly. But I’m not sure that influence is very long-lasting....I don’t have reason to be in touch with many of those people anymore. But I guess when I contacted [two colleagues in senior leader’s department], they did respond quickly. In that case, though, we had some direct experience working together during shadow program.” – Shadow, Technical Track</p>

Table 4.1: Qualitative Evidence – Network Change Following Program Participation (continued)

Category	Mechanism	Representative Quotes
Social Distance	Self-Confidence	<p>“There can be a huge distance emotionally between manager and worker. In this culture, a third-line manager is like a deity. The shadowing program helps shrink the gap.” – Host Executive</p> <p>“I became more confident. It proved to me that I can be helpful to others. Now I feel I can reach out to people even if I don’t know them. I’m also telling [my direct reports]: ‘Don’t hesitate to talk to people, even if you don’t know them’.” – Shadow, Managerial Track</p> <p>“Early in my career, I used to be in awe of leaders. Now, after the shadowing assignment, I think that everyone is just human. I observe everyone. I see the strengths and weaknesses of leaders - no matter if they are vice presidents, senior vice presidents, or general managers.” – Shadow, Managerial Track</p> <p>“People in China tend to be less outgoing than in the US. So [the shadowing assignment] forces them out of their shell. In this culture, it’s especially hard for people to talk to others who are a few levels higher than them. When I first came here, if I said, ‘Hi,’ to a junior person, they would get visibly excited. That’s something we want to change – they should be comfortable talking to anyone.” – Host Executive</p> <p>“In the US, there are a lot of Chinese people who are very hard working and produce very high quality work. But they don’t know how to interact with others. That’s why not a lot of Chinese people move up very high [in the firm]. There are still in critical jobs...but they are not able to enlarge their circle of influence. They are very reserved....The same thing happens here in China....But it is starting to change; we are learning from visitors and from co-workers in the US. The shadowing program also forces them to break out.” – Host Executive</p> <p>“If you put people in a position where they are allowed to ask questions, it changes things. In China, you tend to accept information from your manager. By putting a structure in place that enables them to have a dialogue with senior managers, it increases their comfort level and tells them it is okay to ask questions. Later on, they can overcome their tendency to stay quiet.” – Host Executive</p>

Table 4.1: Qualitative Evidence – Network Change Following Program Participation (continued)

Category	Mechanism	Representative Quotes
Social Distance	Norm Acquisition	<p>“The most helpful thing about the program is being able to observe the interactions of senior people. You can see how [executives] fight and compete against each other. You can see how they show off in front of their own bosses – of how they perform to make themselves look good. That’s a real eye-opener. Also, you learn how they handle different kinds of meetings. For example, the way they manage strategy meetings.” – Shadow, Managerial Track</p> <p>“If you don’t observe a meeting with a General Manager, you don’t really understand what it takes to operate at that level. I think the biggest thing is that [shadows] get a sense of how to talk to people at different levels. And not just people one level above you. The learn how to talk to people in senior management.” – Host Executive</p> <p>“The shadowing program helps junior people understand how senior people think.” – Host Executive</p> <p>“It was good for me to understand how senior people think, how they work, how they make decisions....I also came to realize just how hard [my host executive] works....Some of my employees are Generation Y. They don’t like to work that hard. I can use [the senior leader] as a model to coach them: ‘If you want to get promoted, you have to work hard like [my host executive]’.” Shadow, Managerial Track</p>

Table 4.1: Qualitative Evidence – Network Change Following Program Participation (continued)

Outcome	Representative Quotes
Conversion of Latent Ties to Activated Ties	<p>“I’m not in regular touch any more with some of the people I got to know through shadowing. But with most of the people I built a relationship with, there is still some kind of connection.” – Shadow, Managerial Track</p> <p>“I go to [contacts I met through the shadowing program] for help with knowledge sharing between our teams and technical discussions. For example, we recently invited some of those people to deliver product education sessions to my team members so we could discuss ways to integrate the two products.” – Shadow, Managerial Track</p> <p>“I am still in touch with [the senior leader to whom I was assigned]. I share news with him. I meet him in the dining hall. We have free talk.... I ask for input on my career development, business issues, and team management issues.” – Shadow, Management Track</p> <p>“I still call [a prior shadow] to help me with strategy updates. I ask him, ‘Do you have time to help?’ For lots of tasks we simply don’t have headcount allocated in my department. So I talk to my old shadow, who understands what is needed. Or I even send my people – ‘Please go to talk to [prior shadow].’ I still feel there is a connection there.” – Host Executive</p> <p>“I still go to [the senior leader to whom I was assigned] for information about the organization and politics. He is more open and has a perspective on such things.” – Shadow, Technical Track</p>

All 102 program participants and all 189 eligible control group members were invited to participate in the study. They first received an email about the study from the head of the software development lab and then received a follow up note from me with detailed instructions. Program participants were told that the purpose of the study was to help assess the shadowing program as a whole and to identify ways to improve its design. Those in the control group were told that the study's purpose was to understand the dynamics of workplace social networks in the organization. The communication to this group did not mention the shadowing program. 91 treatment group members (89% participation rate), and 85 control group members (45% participation rate) agreed to participate in this research study.

I implemented three waves of on-line surveys to both groups: one month before the shadowing assignment; part of the way through the 2-3 month assignment; and about two months after the assignment ended.¹¹ Each survey included four network name generators, which were adapted from previous studies of workplace social networks (e.g., Podolny and Baron 1997): (1) task advice ("Over the past two months, from whom at [Company] have you received help or advice about your day-to-day work?"); (2) mentorship ("Over the past two months, from whom at [Company] have you received help or advice about your career or professional development?"); (3) strategic intelligence ("Over the past two months, from whom at [Company] have you received strategic information about the company; e.g., the goals and choices of important individuals, divisions, and [the Company] as a whole?"); and (4) friendship ("Over the past two months, with whom at [Company] have you socialized outside of a work context?"). The surveys for program participants also included questions about their experience with the shadowing assignment – for example, how many hours per week they spent shadowing the

¹¹Because the assignments occurred in two phases, there were actually six survey waves. Control group members received their surveys at the same time as their corresponding treatment group.

senior leader and how well they felt the program met its objectives. In addition, both sets of surveys included questions about respondents' work history and sociodemographic characteristics. Immediately after completing the Wave 1 survey, subjects were asked to complete a timed categorization exercise (described in greater detail below) to measure their implicit collaborative self-concept.

Among the questions about respondents' work history was one asking if they had previously participated in a shadowing or other comparable rotational program. For example, the company had a long history of assigning a small number of high potential individuals to serve on a temporary assignment as an Executive Assistant (similar to an aide-de-camp to a military officer, rather than an administrative assistant) to a high-ranking executive. In addition, there were various informal, smaller-scale shadowing and rotational programs in various offices. A total of 37 individuals – 21 in the control group and 16 in the treatment group – reported having had at least one such an experience in the past. Because the baseline networks of these individuals presumably reflected any potential effects of participation in these past programs, I excluded these individuals from the analyses reported below.¹² Table 4.2 below reports the characteristics of the resulting sample of 139 individuals (64 in the control group and 75 in the treatment group) who had no prior experience with shadowing or rotational programs. There were no statistically significant differences between these groups on observable characteristics or prior career history as reported in the Wave 1 survey. Even though the control group members was matched on past performance rating and tenure, it is, of course, still possible that there were other salient unobserved differences between the treatment and control groups.

¹²Including the 37 individuals in the analyses reported below did not materially change the results reported below.

Table 4.2: Sample Characteristics – Comparison of Control and Treatment Groups

Variable	Control Group	Treatment Group	t-statistic / p value
Age (Years)	36.1	35.7	0.512 / 0.610
Tenure within Firm (Years)	6.09	5.68	0.653 / 0.515
Tenure outside Firm (Years)	4.16	4.91	-0.921 / 0.359
Proportion Holding Advanced Degree	0.781	0.747	0.475 / 0.636
Proportion Female	0.172	0.267	-1.337 / 0.183
Past Career Mobility within Organization (Sum of Prior Changes in Job Role, Supervisor, Business Unit, Office, and Project Team)	9.88	10.7	-0.390 / 0.697
Number of Prior Promotions within Firm	1.44	1.33	0.717 / 0.475

N = 64 for control group and 75 for treatment group.

Finally, it is important to note that, even though participants were encouraged to complete all three waves of the study, some participants only completed one or two surveys. Such sample attrition is a well-recognized problem in longitudinal network studies (Huisman and Steglich 2008; Kossinets 2006). In this case, 139 respondents completed all three surveys, while 99 respondents completed only one or two surveys. That is, the overall attrition rate was 29%. There was slightly more attrition in the treatment group (32%) than in the control group (25%). Table 2 reports the characteristics of those who completed all three survey waves to those who did not complete all three waves. There were no statistically significant differences between the two groups. Similarly, not all subjects completed the timed categorization exercise required to calculate their implicit collaborative self-concept. These data were missing for 24 out of 176 (24%) of subjects. There were again no statistically significant differences between those who completed the exercise and those for whom implicit collaborative self-concept data were missing on the same characteristics as reported in Table 4.3. Nevertheless, I further accounted for sample attrition and missing implicit collaborative self-concept data using inverse probability weighting (Horvitz and Thompson 1952; Robins, Rotnitzky, and Zhao 1995). I report these results in the Robustness Checks section below.

Measures and Estimation

I identified the treatment effect of participation in the program using differences-in-differences estimation with individual fixed effects to account for all unobserved, time-invariant individual differences – for example, stable personality traits such as extraversion.

Table 4.3: Comparison of Individuals Who Completed and Who Did Not Complete All Three Survey Waves

Variable	Completed All Three Waves	Did Not Complete All Three Waves	t-statistic / p value
Age (Years)	35.4	36.4	-1.197 / 0.234
Tenure within Firm (Years)	5.89	5.85	0.070 / 0.944
Tenure outside Firm (Years)	4.19	4.89	-0.868 / 0.387
Proportion Holding Advanced Degree	0.727	0.795	-.927 / 0.356
Proportion Female	0.197	0.247	-0.698 / 0.487
Past Career Mobility within Organization (Sum of Prior Changes in Job Role, Supervisor, Business Unit, Office, and Project Team)	11.0	9.66	0.637 / 0.525
Number of Prior Promotions within Firm	1.38	1.39	-0.082 / 0.935

For Hypothesis 1, response variables included measures of the number of ties reported in each survey wave, including: (a) all ties; (b) task advice ties; (c) strategic intelligence ties; (d) mentorship ties; and (e) friendship ties. The indicator variable, *Treatment*, was set to 1 for program participants. I also created indicators for survey wave: *During Program*, which was set to 1 for Wave 2 responses, and *After Program*, which was set to 1 for Wave 3 responses. The interaction term, *During Program x Treatment*, therefore represents the treatment effect during the program, and the term, *After Program x Treatment*, thus represents the treatment effect that persisted for at least two months after the program concluded. For purposes of hypothesis testing, I focus on the latter (*After Program x Treatment*) because by Wave 3 all subjects had been fully treated. I estimated conditional fixed effect Poisson quasi-maximum likelihood regression models (Wooldridge 1997; Wooldridge 1999), using the “xtpqml” script in STATA (Simcoe 2007), because the response variables were counts of the number of ties activated. The Poisson quasi-maximum likelihood estimator is consistent under relatively weak assumptions: only the conditional mean need be correctly specified, and the standard errors are adjusted to account for over (under) dispersion.

For Hypotheses 2 and 3, the response variable was the proportion of bridging ties that subjects reported activating in each survey wave. I classified a tie as bridging if the contact listed was not in the same department as the respondent. For the models that tested Hypotheses 2 and 3, I estimated conditional fixed effect fractional logit models because the response variable could vary between 0 and 1 (Papke and Wooldridge 1996). For hypothesis tests, I again considered the interaction terms corresponding to Wave 3 – *After Program x Treatment* (Hypothesis 2) and *After Program x Treatment x Implicit Collaborative Self-Concept* (Hypothesis 3).

For Hypothesis 3, to measure the implicit collaborative self-concept, I adapted a previously developed procedure (Srivastava and Banaji 2011). The procedure is based on the Implicit Association Test (IAT) (Greenwald, McGhee, and Schwartz 1998) – the most widely used instrument for measuring aspects of implicit cognition (for a review of different approaches to measuring implicit cognition, see Wittenbrink and Schwarz [2007]). The IAT requires subjects to rapidly sort words representing different categories into groupings. It assumes that subjects will find it easier, and will therefore take less time, to sort some feature that is readily discerned in the subject’s mind, compared with items that are not readily distinguished (for examples of the procedure and a meta-analysis of the IAT’s predictive validity, see Greenwald, Poehlman, Uhlmann, and Banaji [2009]). Given that the study population comprised working professionals who were generally time constrained, I used a recently developed, brief version of the IAT (Sriram and Greenwald 2009), which I implemented using a widely available software program (Inquisit 2006).

For this particular IAT, the categories and associated stimulus words were: (1) “Self” (“I,” “self,” “me,” “myself”); (2) “Other” (“other,” “they,” “them,” “their”); (3) “Collaborative” (“coordination,” “together,” “collaborative,” and “partnership”); and (4) “Independent” (“autonomous,” “solo,” “independent,” and “individual”). On their computer screens, subjects were presented with two configurations of these categories, “Collaborative-Self” and “Independent-Self,” with the order randomly determined. In each configuration, twenty randomly selected stimulus words flashed in succession on the screen. Subjects were asked to indicate with the press of the “K” key if the stimulus word corresponded to either of the two categories shown at the top of the screen. They were instructed to press the “D” key if the stimulus word did not correspond to either category. For example, if the configuration displayed

were “Collaborative-Self,” then subjects would press the “K” key if stimulus word displayed was “coordination” or “myself.” They would press the “D” key if the stimulus word displayed was “autonomous” or “other.” They were instructed to make this determination as rapidly as possible, while minimizing the number of errors. The software program kept track (in milliseconds) of how long it took subjects to categorize the stimulus words and of any errors they made.

Consistent with prior IAT research (Lane, Banaji, Nosek, and Greenwald 2007), I took several steps to address potential quality problems in responses. First, I gave subjects a practice exercise to complete before completing the implicit collaborative self-concept exercise. The purpose of the practice exercise was to familiarize subjects with the IAT procedure and reduce variability from different rates of learning. For the practice exercise, the categories and associated stimuli were: (1) “Male” (“man,” “male,” “he,” “brother”); (2) “Female” (“woman,” “female,” “she,” “sister”); (3) “Self” (same stimuli as above); and (4) “Other” (same stimuli as above). They were presented with two configurations of these categories, “Male-Self” and “Female-Self”. Eight randomly selected stimulus flashed in succession on the screen for each of the two configurations (“Male-Self” and “Female-Self”). Second, to address the possibility that subjects stepped away from their computers in the middle of the exercise or otherwise became distracted, I eliminated all trials with latencies over 10,000 milliseconds. To account for the possibility that subjects were rushing through the study and not processing the stimuli, I eliminated subjects if more than ten percent of their trials had latencies less than 300 milliseconds. Finally, I added a 200 millisecond penalty if subjects made an error in classifying stimuli. After making these adjustments, I calculated the implicit collaborative self-concept (ICS) as follows:

$$\text{ICS} = [\text{Mean Latency (Independent-Self)} - \text{Mean Latency (Collaborative-Self)}] / \sigma_{\text{pooled}}$$

Where: σ_{pooled} = pooled standard deviation (across all 40 trials)

Higher (lower) values of this measure therefore suggest that a subject views herself as more (less) collaborative, rather than independent, in implicit cognition.

For Hypothesis 4, I reverted to conditional fixed effect Poisson quasi-maximum likelihood regression models, this time including an indicator variable, *Female*, and its relevant two-way (*During Program x Female* and *After Program x Female*) and three-way (*During Program x Treatment x Female* and *After Program x Treatment x Female*) interaction terms. I focus on *After Program x Treatment x Female* for hypothesis tests.

Results

Figure 4.2 reports descriptive statistics on reported ties activated by the treatment and control groups. In the control group, there was a decline from in reported ties activated, from 10.5 in Wave 1 to 7.7 in Wave 3. This decline likely reflects respondent fatigue in completing the same instrument three different times (for a discussion of data quality issues in online social network surveys, see Matzat and Snijders [2010]). By comparison, the treatment group reported an increase in the number of ties activated, from 8.3 in Wave 1 to 10.3 in Wave 3. Assuming the control group reflected the baseline trend toward survey fatigue in repeated administrations of this instrument, this 24% increase in reported ties activated by the treatment group likely represents a conservative measure of the treatment effect.

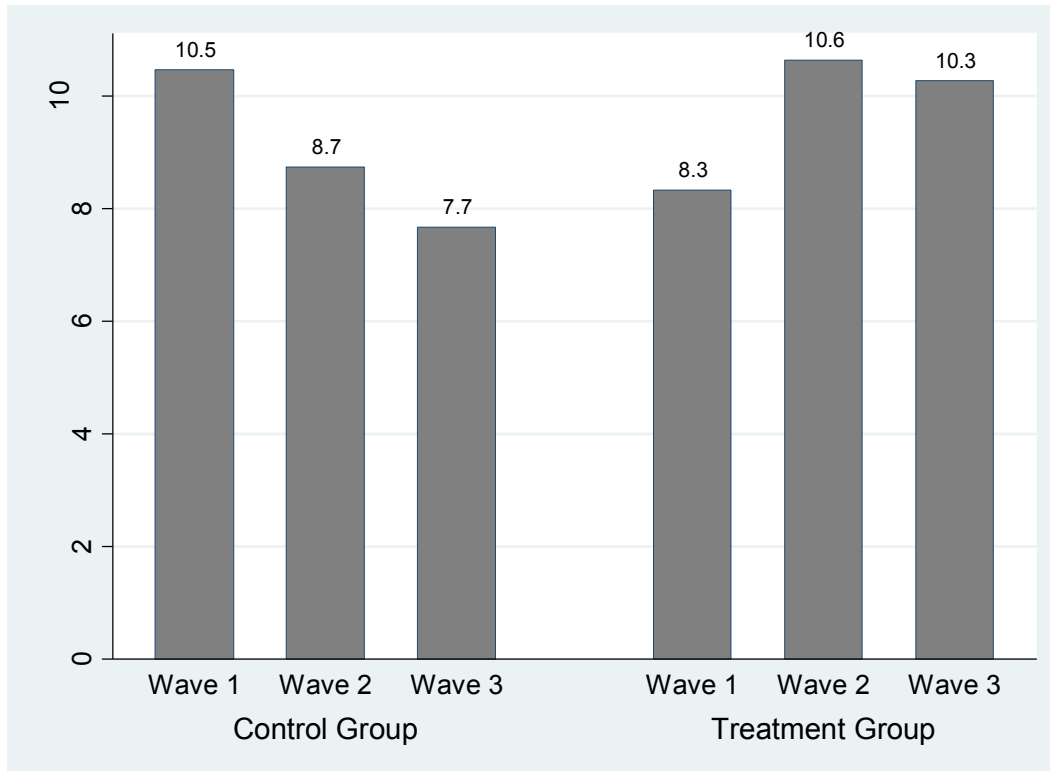
Figure 4.2: Number of Ties Activated by Wave – Control and Treatment Groups

Table 4.4 reports results pertaining to Hypothesis 1 – that participation in the program will lead to an expansion in the number of ties activated by program participants. Model 1 provides differences-in-differences estimates from a conditional fixed effects Poisson Quasi-Maximum Likelihood regression. The positive and significant coefficients for *During Program x Treatment* ($p < .01$) and *After Program x Treatment* ($p < .05$) suggest a positive treatment effect on total ties activated – an effect that persisted even two months after the program concluded. Models 2 through 5 provide differences-in-differences estimates for the four kinds of ties reported. Model 2 indicates a positive and persistent treatment effect for task advice ties. Model 3 suggests that the positive treatment effect for strategic intelligence ties did not persist once the program concluded.

Table 4.4: Conditional Fixed Effects Poisson Quasi-Maximum Likelihood Regression of Reported Ties Activated on Covariates – Hypothesis 1

	Model 1: All Ties	Model 2: Task Advice Ties	Model 3: Strategic Intelligence Ties	Model 4: Mentorship Ties	Model 5: Friendship Ties
During Program	-0.229* (0.112)	-0.273 (0.144)	-0.097 (0.107)	-0.240 (0.124)	-0.249 (0.205)
During Program x Treatment	0.431** (0.152)	0.579** (0.213)	0.460** (0.157)	0.288 (0.172)	0.292 (0.302)
After Program	-0.267* (0.112)	-0.463** (0.162)	-0.163 (0.133)	-0.339* (0.132)	0.022 (0.185)
After Program x Treatment	0.306* (0.151)	0.596** (0.226)	0.200 (0.161)	0.353* (0.171)	-0.080 (0.267)
Chi2	11.703	12.565	13.389	8.456	3.953
prob>Chi2	0.020	0.014	0.010	0.076	0.412
N	361	361	361	361	361

* p<0.05, ** p<0.01, *** p<0.001; fixed effect coefficients not reported.

In Model 4, which considered mentorship ties, *After Program x Treatment* is positive and significant; however, the model as a whole is only marginally significant ($p<.10$). Finally, Model 5 indicates that the program had no significant effect on friendship ties. Together, Models 1 through 5 lend support for Hypothesis 1. Moreover, they suggest that the program was most effective in producing a positive and lasting increase in task advice ties.

Table 4.5 includes results that speak to Hypotheses 2 – about the program's effects on the proportion of bridging ties activated by participants. In Model 6, neither *During Program x Treatment* nor *After Program x Treatment* is significant. In Models 7 through 10, *During Program x Treatment* is not significant, and in all but Model 8, *After Program x Treatment* is also not significant. In Model 8, contrary to expectations, *After Program x Treatment* has a negative and significant ($p<.001$) coefficient. That is, participation in the program appeared to lead to a decrease in the proportion of bridging strategic ties, perhaps because participants

became more reliant on just their executive host, rather than their broader network, for strategic intelligence. Overall, these results do not support Hypothesis 2.

Table 4.5: Conditional Fixed Effects Fractional Logit Regression of Proportion Bridging Ties on Covariates – Hypothesis 2

	Model 6: All Ties	Model 7: Task Advice Ties	Model 8: Strategic Intelligence Ties	Model 9: Mentorship Ties	Model 10: Friendship Ties
During Program	-0.093 (0.192)	-0.317 (0.349)	-0.063 (0.447)	-0.372 (0.341)	0.139 (0.299)
During Program x Treatment	-0.188 (0.308)	0.132 (0.510)	-0.569 (0.612)	0.280 (0.543)	0.440 (0.352)
After Program	-0.107 (0.214)	-0.755* (0.368)	0.664 (0.368)	-0.904 (0.483)	-0.189 (0.342)
After Program x Treatment	-0.603 (0.317)	-0.183 (0.530)	-1.997*** (0.552)	0.205 (0.662)	0.317 (0.410)
Constant	0.330 (0.708)	0.604 (0.811)	1.326** (0.419)	0.396 (1.292)	-0.337 (0.178)
Chi2	1.3e+08	5.7e+09	2.0e+13	56008	4.76
prob>Chi2	0.000	0.000	0.000	0.000	0.313
N	343	336	305	308	256

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; Fixed effects included but coefficients not reported for Models 6-9; Model 10 could not be estimated with fixed effects so results reported are without fixed effects.

Table 4.6 reports results related to Hypothesis 3 – that the tendency to form and activate bridging ties following program participation will be amplified for individuals with a more collaborative, rather than independent, implicit self-concept. In Model 11, *During Program x Treatment x Implicit Collaborative Self-Concept* is positive but not significant, while *After Program x Treatment x Implicit Collaborative Self-Concept* is positive and significant ($p < .05$). In Model 12, *After Program x Treatment x Implicit Collaborative Self-Concept* is also positive and significant ($p < .01$). That is, the implicit collaborative self-concept positively moderated the program's effects on the proportion of bridging ties, particularly task-related bridging ties, that participants reported activating two months after the program concluded. Hypothesis 3 is

therefore supported.¹³ Surprisingly, the coefficient for *After Program x Implicit Collaborative Self-Concept* in Model 12 was negative and significant, suggesting that more implicitly collaborative members of the control group reporting activating a lower proportion of bridging ties following program participation.

Table 4.7 reports results that correspond to Hypothesis 4 – that participation in the program will have a more positive effect on the formation and activation of ties for female participants, relative to males. Model 16 provides the differences-in-differences estimates from a conditional fixed effects Poisson regression that includes the three-way interaction terms, *During Program x Treatment x Female* and *After Program x Treatment x Female*. The former is not significant, while the latter is positive and significant ($p < .001$). That is, the treatment effect was not significant for males but strongly positive and significant for females. Thus, Hypothesis 4 is supported. Models 17 through 20 indicate that sex-based differences in the treatment effect were associated with task advice and mentorship ties – but not with strategic intelligence or friendship ties.¹⁴

¹³In a supplemental analysis, I also considered the potential moderating role of the explicit – that is, self-reported – measure of the collaborative self-concept. I used a 7-point self-reported measure, ranging from “I strongly prefer to work independently” to “I strongly prefer to work collaboratively” (Srivastava and Banaji 2011). The correlation between the explicit and implicit measures in this study was 0.18, comparable to the 0.16 correlation reported by Srivastava and Banaji. Consistent with Srivastava and Banaji’s findings, the self-reported measure was not associated with bridging ties (i.e., *During Program x Treatment x Explicit Collaborative Self-Concept* and *After Program x Treatment x Explicit Collaborative Self-Concept* were not significant covariates), while the implicit measure was positively associated with bridging ties. To address potential measurement error stemming from a single-item explicit measure, I also constructed a four-item alternative measure (sample item: “How often do you agree to help or support others on their work assignments?”). This four-item measure was also not associated with the tendency to form bridging ties.

¹⁴In supplemental analyses (not reported), I also tested for an interaction between sex and the proportion of bridging ties reported. In these regressions, *After Program x Treatment x Female* was not a significant covariate.

Table 4.6: Conditional Fixed Effects Fractional Logit Regression of Proportion Bridging Ties on Covariates, Including Implicit Collaborative Self-Concept – Hypothesis 3

	Model 11: All Ties	Model 12: Task Advice Ties	Model 13: Strategic Intelligence Ties	Model 14: Mentorship Ties	Model 15: Friendship Ties
During Program	-0.064 (0.186)	-0.249 (0.360)	0.217 (0.478)	-0.490 (0.347)	0.155 (0.390)
During Program x Treatment	-0.528 (0.283)	-0.277 (0.505)	-1.142 (0.634)	-0.296 (0.532)	0.281 (0.447)
During Program x Implicit Collaborative Self-Concept	-0.057 (0.518)	-1.443 (1.086)	-1.951 (1.359)	1.788* (0.774)	-0.929 (1.140)
During Program x Treatment x Implicit Collaborative Self-Concept	0.705 (0.806)	2.047 (1.507)	3.183 (1.797)	-0.455 (1.274)	-0.144 (1.358)
After Program	-0.134 (0.275)	-0.934* (0.468)	0.579 (0.399)	-1.271* (0.634)	-0.349 (0.411)
After Program x Treatment	-0.764* (0.359)	-0.359 (0.616)	-1.954*** (0.582)	-0.192 (0.784)	0.564 (0.476)
After Program x Implicit Collaborative Self-Concept	-0.970 (0.699)	-3.391** (1.278)	-0.026 (1.040)	-1.588 (1.729)	-1.873 (1.172)
After Program x Treatment x Implicit Collaborative Self-Concept	1.921* (0.866)	4.697** (1.577)	1.153 (1.374)	3.302 (2.084)	2.523 (1.395)
Constant	0.602 (0.715)	0.970 (0.821)	1.855*** (0.481)	1.417 (1.275)	-0.325 (0.191)
Chi2	1.3e+09	4.7e+09	7.5e+08	36300	8.690
prob>Chi2	0.000	0.000	0.000	0.000	0.369
N	243	240	220	221	187

* p<0.05, ** p<0.01, *** p<0.001; Fixed effects included but coefficients not reported for Models 11-14; Model 15 could not be estimated with fixed effects so results reported are without fixed effects.

Table 4.7: Conditional Fixed Effects Poisson Regression of Degree on Covariates – Hypothesis 4

	Model 16: All Ties	Model 17: Task Advice Ties	Model 18: Strategic Intelligence Ties	Model 19: Mentorship Ties	Model 20: Friendship Ties
During Program	-0.262* (0.119)	-0.311* (0.150)	-0.111 (0.109)	-0.267* (0.131)	-0.316 (0.226)
During Program x Treatment	0.354* (0.174)	0.539* (0.242)	0.379* (0.178)	0.187 (0.187)	0.207 (0.347)
During Program x Female	0.361 (0.270)	0.425 (0.317)	0.224 (0.534)	0.299 (0.299)	0.578 (0.335)
During Program x Treatment x Female	0.021 (0.317)	-0.129 (0.429)	0.120 (0.581)	0.116 (0.412)	-0.070 (0.528)
After Program	-0.242* (0.120)	-0.415* (0.164)	-0.167 (0.138)	-0.304* (0.148)	0.012 (0.198)
After Program x Treatment	0.110 (0.171)	0.424 (0.251)	0.133 (0.177)	0.075 (0.187)	-0.338 (0.313)
After Program x Female	-0.449* (0.194)	-0.773 (0.466)	0.043 (0.490)	-0.348* (0.172)	-0.163 (0.367)
After Program x Treatment x Female	1.007*** (0.276)	1.216* (0.563)	0.200 (0.529)	1.091*** (0.297)	0.962 (0.498)
Chi2	58.154	22.517	20.714	77.977	15.437
prob>Chi2	1.07e-09	.0040424	.0079478	1.25e-13	.0511794
N	361	361	361	361	361

* p<0.05, ** p<0.01, *** p<0.001; fixed effect coefficients not reported.

Robustness Checks

Although there were no significant differences in observable characteristics between those who completed all three survey waves and those who did not or between those who completed the IAT procedure and those who did not, it is still possible sample attrition and missing data served to bias the estimates. To better account for these factors, I estimated the models using inverse probability weighting (IPW) (Horvitz and Thompson 1952; Robins, Rotnitzky, and Zhao 1995; Wooldridge 2002). Specifically, I first estimated a logit model in which an indicator variable set to 1 for subjects who participated in all three survey waves was regressed on age, tenure within the firm, and whether or not the person held an advanced degree. I then calculated the inverse of

the predicted probabilities. Next I re-estimated the models, while weighting the observations by these inverse predicted probabilities. The results were comparable to those reported in Tables 4, 5, 6, and 7, with two exceptions: (1) *After Program x Treatment x Implicit Collaborative Self-Concept* in Model 11 was marginally significant ($p=.08$) with IPW but significant ($p<.05$) otherwise; and (2) *After Program x Treatment x Female* in Model 20 was significant ($p<.05$) with IPW but marginally significant ($p=.054$) otherwise. I repeated this procedure with a logit model in which the response variable was an indicator set to 1 for subjects who completed the IAT procedure to measure their implicit collaborative self-concept. Again, weighting the observations by the inverse of the predicted probability of participants completing the IAT procedure yielded comparable results to those reported above. Although these analyses suggest that the reported findings were robust to sample attrition, they must still be interpreted with caution because attrition was modeled just on observable characteristics.

DISCUSSION AND CONCLUSION

The goal of this article has been to identify the causal effects of a common workplace practice – cross-training – on the interpersonal networks of employees. I report findings from 40 semi-structured interviews and the results of a longitudinal field experiment involving 176 employees in a software development laboratory in China. In developing the theoretical arguments, I draw the distinction between new tie formation and the activation of pre-existing ties (Hurlbert, Haines, and Beggs 2000). I argue that, relative to non-participants, participants in cross-training will report an increase in activated ties and report a greater proportion of bridging ties because cross-training will expand their opportunity structure for contact and decrease the cognitive barriers to network activation across internal organizational boundaries. Results from the field

experiment indicate that participants in cross-training did report an increase in activated ties – in particular, those involving task advice and mentorship – but not a general increase in the proportion of bridging ties. I further argue that a cognitive orientation – the implicit collaborative self-concept (Srivastava and Banaji 2011) – will positively moderate the effects of cross-training on the proportion of bridging ties reported by participants. Findings from the field experiment support this view. Finally, I argue that female will experience greater network benefit from cross-training than males because participating in such programs ameliorates the structural disadvantages of job segregation (Lin 2000; McGuire 2000; Moore 1990), increases the visibility of females and helps overcome the negative effects of stereotyping (Kalev 2009), and – to the extent that it involves assignment to a high-status sponsor – enables females to gain greater legitimacy by borrowing social capital from a well-connected individual (Burt 1998). The results are consistent with this expectation: females participating in cross-training reported activating more ties – including those related to task advice and mentorship – than did their male counterparts. The qualitative evidence provides greater insight into the mechanisms – for example, exposure to the skills of colleagues in other subunits and increased self-confidence of program participants – that enabled some participants to build and later activate new connections.

Limitations and Directions for Future Research

The study has two major limitations. First, as is common in longitudinal field experiments, there was considerable sample attrition. Although I implemented inverse probability weighting (Horvitz and Thompson 1952; Robins, Rotnitzky, and Zhao 1995; Wooldridge 2002) to account for this attrition, the model of attrition was based only on subjects' observable characteristics. It is conceivable that unobserved characteristics were associated with both the likelihood of

dropping out of the study and the outcome of interest. Future research designs can better account for attrition due to unobserved traits by using instrumental variable techniques. For example, Huber (forthcoming) suggests the following approach for longitudinal surveys: randomly choosing the number of reminder messages that subjects receive to complete each survey wave. This variable could serve as a valid instrument, given that it would likely be correlated with a person's likelihood of completing the study.

Second, because this study draws on data on well-performing employees in a single organization, we must consider the extent to which these findings can be generalized to other settings and employee populations and the potential threat from selection bias. Moreover, although name generators of the kind used in this study yield comparable “core discussion networks” among Chinese and American respondents (Ruan 1998), prior research also suggests important cultural differences in how people use networks and mobilize resources (e.g., Bian 1997; Ruan, Freeman, Dai, Pan, and Zhang 1997; Xiao and Tsui 2007). These cultural differences were mitigated to some extent in this empirical setting, given that the software development lab was part of a US-based multinational but located in China. Nevertheless, further work is needed to understand the role of institutional factors in shaping the outcomes of work practices such as cross-training.

Contributions

In spite of these limitations, the findings from this study contribute to three distinct literatures. First, the study brings to research on the consequences of changing work practices (e.g., Cappelli, Bassi, Katz, Knoke, Osterman, and Useem 1997; Cappelli and Neumark 2001; Kalleberg, Marsden, Reynolds, and Knoke 2006; Osterman 2000) empirical evidence about the link between cross-training, a practice that has diffused broadly across organizations, and

workplace networks. Whereas prior research had theorized such a connection, this study represents – to the best of my knowledge – the first to provide a direct causal test. It also provides insight into sub-populations that are most likely to benefit when a firm introduces such practices and the mechanisms through which these practices produce network change.

The findings also contribute to a growing body of research that seeks to identify the causal link between aspects of individual cognition and network formation and change (e.g., DiMaggio 1997; Kilduff and Krackhardt 1994; Kilduff and Krackhardt 2008; Lizardo 2006; Morgan and Schwalbe 1990; Vaisey and Lizardo 2010). In particular, the study shows how individual differences in cognition – in particular, views of the self as a collaborative actor in less conscious, or implicit, cognition (Srivastava and Banaji 2011) – can influence who stands to benefit most from employee development programs designed to expand or extend workplace networks. Whereas prior research established the association between the implicit collaborative self-concept and bridging ties in a laboratory study and in cross-sectional network analysis, this study demonstrates a causal link between this cognitive orientation and subsequent network change. Moreover, the inclusion of individual fixed effects in the analysis provides greater assurance that these results were not influenced by other, potentially related stable individual differences such as extraversion (Doeven-Eggens, De Fruyt, Hendriks, Bosker, and Van der Werf 2008) or self-monitoring (Mehra, Kilduff, and Brass 2001).

Finally, the results from this study contribute to research on organizational practices and ascriptive inequality in the workplace (e.g., DiPrete and Nonnemaker 1997; Huffman, Cohen, and Pearlman 2010; Kalev 2009; Kalev, Kelly, and Dobbin 2006). Although previous studies argued that workplace practices designed to support greater cross-functional collaboration will lead to declines in ascriptive inequality, the core mechanism of network change was unobserved

in prior research (Kalev 2009). This study provides direct evidence of the effects of cross-training on the networks of male and female employees. The results – that female participants in cross-training reported a larger expansion in activated networks than did males – provide strong empirical support for McGuire’s (2000: 519) contention that programs such as cross-training are essential if companies seek to “equalize access to informal networks at work.”

Conclusion

This study demonstrates the value of longitudinal field experiments in uncovering the complex interplay among workplace practices, status characteristics, individual differences in cognitive orientations, and workplace network patterns. Such an approach promises to help network research in continuing to make the shift from simply characterizing internal network patterns and associated outcomes to producing tangible prescriptions about organizational practices that can support individual attainment and ameliorate workplace inequality.

CHAPTER 5: CONCLUSION

The goal of this dissertation has been to contribute to a shift in our understanding of workplace social networks. Whereas prior research has importantly highlighted the role of internal network *structure* in shaping individual and organizational outcomes, the three empirical studies in this dissertation advance our understanding of network *action* – in particular, how people use social resources in the workplace and what organizational interventions can help organizational actors form valuable new connections. As detailed in the preceding chapters, findings from these studies contribute to research on: (1) organizational social capital; (2) the structural dynamics of organizational change; (3) ascriptive inequality in organizations; (4) cognition and social networks; and (5) workplace practices and network change.

The dissertation also points to several promising directions for future research. Each of the preceding chapters concludes with a list of specific research questions that are raised by the findings. Here I highlight three broad themes that I anticipate will animate my own work and that I hope others will also pursue in the future.

Social Psychological Underpinnings of Social Capital Activation

This dissertation – for example, the experimental studies in Chapter 3 and analyses of the link between the implicit collaborative self-concept (Srivastava and Banaji 2011) and outcomes of cross-training – only scratched the surface of the social psychological underpinnings of network activation. Further work in this vein could profitably examine how organizational actors experience and interpret broader classes of organizational change – for example, mergers, senior leadership transitions, spin-outs, and recapitalizations – and how these interpretations in turn shape how they mobilize social resources through networks. Some of these patterns – for example, the tendency reported in Chapter 3 to activate larger and broader networks when faced

with uncertain losses – are likely to generalize across organizational settings. Others – such as the moderating role of internal locus of control in network activation choices – are likely to vary across individuals. Such insights can help organizational leaders anticipate how people will respond to change and therefore thereby develop more effective change management strategies.

Social Capital Activation Outcomes

The studies in this dissertation included tantalizing hints about the link between network activation and outcomes – for example, the association described in Chapter 2 between activation choices during a restructuring event and mobility outcomes several months later. Yet none of these studies allowed for causal identification of these effects. In this regard, I see great potential for experimental designs. Consider the following high-level design. Subjects drawn from samples of working professionals are asked to elaborate their networks and then given a problem solving or creative task, the quality of which can be objectively evaluated by a third party (e.g., Burt 2004). They then complete the task independently. Next, they are randomly assigned to activate certain subsections of their network – that is, to initiate contact with certain kinds of colleagues (e.g., those in a different formal subunit or at a different hierarchical level) – to seek input on the task (for an illustration of a related design, see Levin, Walter, and Murnighan [2011]). After receiving the input, they have the opportunity to redo or revise the task. Finally, both tasks – before and after network activation – are then evaluated by the objective third party. Such a design would enable researchers to assess the effects of network activation on outcomes – such as innovation – that are likely associated with attainment in many organizations.

As Chapter 2 implies, individual-level network activation choices can cumulate to produce aggregate shifts in internal structure. Prior research has demonstrated that the shape of internal network structure – for example, the proportion of internal ties that span formal

organizational subunits – can influence organizational-level performance during times of crisis (Krackhardt and Stern 1988). Thus, the question arises: can individual-level network activation influence organizational resilience? This question would be exceedingly difficult to study in real field settings. I believe it could, however, be examined in the context of an agent-based simulation (see, for example, Davis, Eisenhardt, and Bingham [2009]). Insights about the social psychology of network activation could inform the setting of parameters by which agents representing different kinds of organizational actors – e.g., those directly affected by an impending organizational change, those knowledgeable about but unaffected by the change – make choices about which network ties to activate and which new ties to form. These choices could be modeled in the context of different organizational structures and with varying assumptions about the shape of pre-existing network structure. These analyses could help inform our understanding of the conditions under which social capital activation supports or hinders consistency between formal and informal structure and thereby influences organizational performance (Gulati and Puranam 2009).

Field Experiments – Network Interventions

Finally, the dissertation sets the stage for further research on how organizational leaders can actively shape internal network structure. The field experiment described in Chapter 4 could be readily extended to other interventions – such as global mobility programs, job rotation, the formation of professional communities, and the introduction collaboration incentives – that organizations often employ in part to shift internal network structure. Implementing a portfolio of such experiments would help inform the managerial question: given that networks matter, how can we actively construct network structures that support organizational performance? Perhaps the greatest promise for network research lies in answering this question.

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APPENDIX

Appendix 2.A – Interview Schedule

1. Could you tell me about your career history? What is your role at [InfoCo] today? What role did you have prior to the restructuring event?
2. Think back to the recent reorganization.
 - a. When did you first learn of these changes? How did you learn of them?
 - b. How did you think you would be affected? How were you actually affected?
 - c. How certain were you of the implications for you personally? At what point did the personal career implications become clear for you?
 - d. Did you initiate contact with any of your colleagues to discuss the situation? If so, whom did you reach out to? Why did you reach out to these people? How did you reach out to those people – i.e., what form of communication?
 - e. Did others initiate contact with you to discuss the situation? If so, who reached out to you? Why did they do so? How did they do so?
3. Emails and email distribution lists:
 - a. What kinds of communication do you tend to have over email? By phone? Face-to-face?
 - b. During sensitive times, such as the period of restructuring, how do you use these different communication media?
 - c. How do you use email distribution lists in communicating with others? What lists are you part of? When do you decide to create a new list? When do you get rid of a list?

Appendix 2.B – Uncertainty Reactions of Less Senior Employees

- Sales vice president: “I had just about everyone from the sales organization stopping by my office at that time. They kept asking, ‘What’s going on? What does this mean for me?’ If they had any sense that the changes would impact them directly, you could be sure they were out there trying to find out about them’.”
- Director of product development: “I remember 20-25 junior people coming to my office during that time. They were trying to figure out if the company was collapsing, if their manager was going to change, and who was likely to become their new manager.”
- Sales support leader: “I was approached by subordinates or others further down in the organization because I’ve been through a tremendous amount of change....[An] inordinate number of people...came to see me, especially those worried about...outsourcing.”
- Marketing support director: “I think the restructuring was worse for people below me. It was less unsettling for me because I had confidence in my own marketability and brand recognition within the company. In the game of musical chairs, I was very confident that I’d have a chair when the music stopped. And if I didn’t have a chair, I was pretty marketable on the outside. When you look at people further down, you find a lot of long-timers, who only know the InfoCo way, or very young people. Both groups are vulnerable and worried in these times.”
- A division general manager: “All of my direct reports had questions and a lot of uncertainty, which was even more amplified than my own – even though I didn’t know any more than they did. Because they were a step removed from the decisions, their uncertainty was even greater.”

**Appendix 2.C: Logit Model of Exit from Firm
(Fourteen Months After Observation Period)**

	Model C1	Model C2	Model C3	Model C4	Model C5
Age in Years	0.120** (0.039)	0.144** (0.045)	0.127** (0.040)	0.138** (0.044)	0.136** (0.046)
Log Tenure in Years	-0.722* (0.342)	-0.884** (0.339)	-0.730* (0.351)	-0.741* (0.356)	-0.714 (0.372)
Senior Rank	-0.041 (0.861)	-0.966 (0.836)	-0.695 (0.902)	-0.836 (0.830)	-0.345 (0.884)
Female	-0.744 (0.606)	-0.337 (0.670)	-0.618 (0.642)	-0.609 (0.666)	-0.520 (0.691)
White	-0.439 (0.575)	-1.041 (0.629)	-0.737 (0.630)	-0.658 (0.610)	-0.922 (0.600)
Log Communication Volume in Period of Uncertainty	-0.381* (0.168)	0.305 (0.270)	0.077 (0.300)	0.246 (0.313)	-0.133 (0.220)
Messages Sent to Colleagues in Different Departments during Uncertainty – Residual		-18.715* (8.991)			
Messages Sent to Colleagues in Same Department during Uncertainty – Residual		-0.397 (0.271)			
Messages Sent to Distant Colleagues in Work Group Structure during Uncertainty – Residual			-3.817 (3.958)		
Messages Sent to Proximate Colleagues in Work Group Structure during Uncertainty – Residual			-3.820 (2.492)		
Messages Sent to Different-Sex Colleagues during Uncertainty – Residual				-6.274* (2.856)	
Messages Sent to Same-Sex Colleagues during Uncertainty – Residual				-4.161 (2.813)	

**Appendix 2.C: Logit Model of Exit from Firm
(Fourteen Months After Observation Period) - Continued**

	Model C1	Model C2	Model C3	Model C4	Model C5
Messages Sent to Different-Ethnicity Colleagues during Uncertainty –					-8.065***
Residual					(2.433)
Messages Sent to Same-Ethnicity Colleagues during Uncertainty –					-0.678
Residual					(2.820)
Constant	-3.013 (1.926)	-6.110** (2.363)	-4.787* (2.203)	-6.028* (2.515)	-4.627* (2.239)
Chi2	21.191	23.661	20.280	24.344	22.354
prob>Chi2	0.002	0.003	0.009	0.002	0.004
N	114	114	114	114	113

* p<0.05, ** p<0.01, *** p<0.001; two-tailed tests; robust standard errors in parentheses. Residuals are the mean difference, across the weeks of uncertainty, between actual and predicted messages to different types of colleagues (e.g., those in the same or different departments). Distant colleagues in the work group structure defined as those above the median distance across all dyads (i.e., *Distance in Work Group Structure_i*); proximate colleagues defined as those at or below the mean.

Appendix 3.A – Manipulations

CEO Voicemail: Good morning. I would like to share some important news with you. In light of changing business conditions, we have decided today to implement a [*Loss*: restructuring / *Gain*: new growth plan], which will result in some changes in organizational structure and reporting lines.

Later today, you will receive a memo that outlines these changes and explains why they are necessary to ensure the long-term health and competitiveness of our enterprise. As these changes play out, you can expect to receive regular updates from me and others in your management team. Thank you for your attention and support.

Follow-up Communication: After listening to the voicemail from the CEO, you had a private meeting with a trusted colleague who works elsewhere in the organization. This colleague has heard through the grapevine (i.e., through unofficial channels) some additional details about the situation and what it might mean for you. The colleague is well placed in the organization and has been a reliable source for you in the past.

[*Loss*: Your colleague informed you that – as part of the reorganization – the organizational unit you are in will be merged with another unit. Your manager, who heads your unit, will be moving to a different part of the organization. The head of the other unit will run the combined group.

Several different options for how to structure the combined entity are being considered. One option would involve inserting a management layer between you and the new unit head (i.e., you would report to someone else, who would report to the unit head). The person they are considering to be your new manager is someone from the other unit whom you do not know well but have generally considered a peer.]

[*Gain – Constrained*: Your colleague informed you that – as part of the reorganization – a new position is opening up to lead a new unit that will pursue exciting new growth opportunities for the organization. There are several candidates for this position, and you are among those being considered.]

[*Gain – Agency*: Your colleague informed you that – as part of the reorganization – several positions are opening up to lead new units that will pursue exciting growth opportunities for the organization. There are several candidates for these positions, and you are among those being considered for one of these positions.]

Such a change would represent a significant step [*Loss*: back / *Gain*: forward] for you in your career and [*Loss*: hurt / *Gain*: build] your status in the organization. In addition, this change in job role would likely result in [*Loss*: a reduction / *Gain*: an increase] in your total financial rewards. [*Gain*: You would not have to relocate to take on this new role, and the workload and travel requirements would be no worse than what they currently are.]

Appendix 3.A – Manipulations (continued)

[*Loss – Constrained*: Given the current business climate and mix of available skills, you are fairly confident that – if this change were considered necessary – you would have little choice in the decision or in the design of your new job role. There would be limited room to maneuver.]

[*Loss – Agency*: The person to whom you could potentially report is, however, known for being a hands-off manager, who would likely give you a great deal of freedom to shape the job role and work autonomously. The person has a well-deserved reputation for creating space for subordinates to operate independently, and with the combination of the two units, you would have considerable room to maneuver.]

[*Gain – Constrained*: Given the organization’s ambitious growth plans and the mix of available skills, you are fairly certain that – if you were offered this position – you would have little choice in the decision. You would be asked to take on this role in the best interest of the organization, and it would be very hard to turn down the offer.]

[*Gain – Agency*: Given that several new positions are opening up, you would likely have considerable freedom to choose among other comparable positions – or to stay in your current position – if you were made an offer and decided to turn it down.]

Your colleague concluded the conversation by emphasizing that no decisions have yet been made and that various organizational and staffing options are still being considered.

[*Constrained*: You are, however, unlikely to have much influence on the decision outcome. / *Agency*: You might still be able to influence the decision outcome.]

Appendix 4.A: Interview Schedule

1. Could you please give a brief summary of your career history?
2. Why did you choose to participate in the shadowing program? What were you hoping to get out of the experience?
3. What did it mean to [you / your shadow] to be selected into the program? How was it viewed more generally in the organization?
4. [Who are the people who have shadowed you to date? / Whom have you shadowed?] How was the match made? How much influence did you and the other person have in the match decision?
5. Which unit [within the software lab] were you in at the time? Which unit was [the person assigned to shadow you / person you shadowed] in?
6. Did you or [the person assigned to shadow you / person you shadowed] have any specific objectives for the shadowing experience? If so, what were they?
7. Could you please walk me through the initial stages of the shadowing experience? How did you and [the person assigned to shadow you / person you shadowed] first make contact with one another? What did you discuss?
8. How many hours per week did [you / your shadow] spend together? How did the amount of time together vary over the course of the assignment? What was a typical day like?
9. Did [you / your shadow] form any new relationships as a result of the assignment? Did [you / your shadow] experience any change in existing relationships as a result of the assignment? Did the size of [your / your shadow's] workplace network change as a result of the assignment? Did the composition of [your / your shadow's] workplace network change as a result of the assignment? [For each question] If so, how did this happen?
10. Did [you / the person to whom you were assigned] introduce [your shadow / you] to any of [your / his or her] contacts? If so, who were they? Were they internal or external contacts? If internal, which unit did they work in? What was the context in which this introduction took place? What did you see as the benefits and risks of making the introduction?
11. [Was your shadow / Were you] able to form an independent relationship with these individuals? If so, how would you describe the relationship? How is this relationship similar to or different from the one [you / the person you shadowed] have with this individual?
12. Do you believe [your shadow / you] changed personally or professionally as a result of the experience? If so, how?
13. How well do you think the shadowing experience met your objectives? [Your shadow's objectives / the objectives of the person you shadowed]? The organization's objectives?
14. How did the shadowing experience conclude?
15. What level of contact have you maintained with [your shadow / the person you shadowed] since the assignment ended? How would you characterize the relationship today?
16. Do you believe that any changes to [your shadow's / your] network lasted beyond the assignment period? If so, how would you characterize the change? Do you believe [your shadow / you] have changed in other ways as a result of the experience? If so, how?
17. As you reflect on the shadowing experience as a whole, what do you think were the most helpful aspects? The least helpful aspects? What, if anything, would you change about the experience?